MANUAL OF INDIAN TIMBERS:

THE STRUCTURE, GROWTH, DISTRIBUTION, AND QUALITIES OF INDIAN WOODS.

PREPARED BY

J. S. GAMBLE, M.A., F.L.S.,

OFFICIATING CONSERVATOR OF FORESTS, BENGAL



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INTRODUCTION.

In publishing the 'Manual of Indian Timbers,' the compilation of which has, owing to the writer having been at the same time engaged in his ordinary official duties, lasted over three years, it is necessary to make a few remarks on the circumstances which have led to its preparation, the materials by the assistance of which it has been compiled, and the sources from which the information given in its pages has been drawn. It will be remembered that the forests and forest products of India were represented at the Paris Exhibition of 1878 by a collection which was undoubtedly the most complete that has ever been formed in India and sent to Europe for exhibition. This collection, prepared and arranged under the immediate supervision of Dr. Brandis, the Inspector General of Forests, was got together in the winter of 1877-78, by the simple process of inviting from the different Local Governments and their Forest Officers the contribution of rough wood specimens and other products, which were afterwards prepared and arranged in a central workshop, first in Simla and afterwards in Calcutta. During the progress of this work, which lasted from August 1877 to May 1878, a very large and valuable series of wood specimens, of undoubted botanical determination, was received. The pieces of wood (to which class of specimen alone we need now refer) which were then sent, were so large and valuable that it was settled that at the same time as the principal object of the work, the collection for exhibition at Paris, was got ready, a number of duplicate sets should be also prepared, sufficient to supply a good stock to the Royal Gardens at Kew, and to other museums both in Europe and America, as well as type collections to be deposited in the offices of the Forest Conservators in the different Provinces or Circles. It is obvious that such authentic collections are likely to serve as reference collections of great and undoubted value not only to Forest Officers, but to all persons interested in timber and ornamental woods and their applications to engineering works or industrial manufactures. Chief among these collections was that specially set apart for the Museum of the Forest School of Dehra Dun, and next to it in completeness in India was the collection deposited in

the office of the Conservator of Forests in Bengal at Darjeeling, and it is these two collections, and especially the former, which have been chiefly used and consulted in the preparation of this work. But it is necessary here to point out, that the collections prepared in 1877-78 from the contributions to the Paris Exhibition works, would not alone have sufficed for the description of anything like the number of species which find a place herein, and it was owing to the fortunate circumstance that the large private collection of Dr. Brandis was available that it was found possible to make sure of the identification of most of the more ordinary timbers and lay the foundation for the descriptions which are now published. When it is considered that Dr. Brandis' private collection gave no less than 320 specimens, and that the private collection personally formed by the writer in the Darjeeling forests, and that of Burmese and Andaman woods made by the late Mr. S. Kurz and presented by the Superintendent of the Royal Botanical Gardens, Calcutta, gave a further series of 194 specimens, it will be understood that considerable material was available to add to the nucleus formed by the Paris Exhibition sets. But this is not all, for, by the kindness of several Forest Officers, supplementary pieces were received, sometimes spontaneously, sometimes by special request, from time to time; and there have been, even since the work itself was completely printed, several important additions. These were chiefly obtained by the writer's personal collection in various parts of Bengal, such as Darjeeling, the Western Dúars, Chittagong, Chota Nagpore, and Orissa, and have been described, if not in the pages of the work, at any rate in the rather voluminous Adddenda-Corrigenda sheets. In order to explain more definitely the sources from which the original Paris Exhibition woods were obtained, the following extract from Dr. Brandis' Introduction to the Catalogue of specimens of forest produce sent to that Exhibition will be worth quoting :—

"The orders for the preparation of the present collection were received in August 1877; and, as it was necessary to despatch it early in February 1878, so as to be in time for the Exhibition, barely six months were available to bring together specimens from all parts of India, and to prepare and name them. The work was entrusted to the undersigned and to Mr. J. S. Gamble, Assistant Conservator of Forests, who undertook the task of supervising the preparation of the specimens. A workshop was at once established in Simla, and a large number of pieces were collected from the hills in the vicinity of that place. These specimens are numbered from 1 to 115, and from 145 to 159. Early in November the work was transferred to Calcutta, where the specimens from all provinces were collected.

"The bulk of the logs and pieces from which the specimens were prepared arrived in December and January; some, however, were not received until February, after the collection had been prepared, packed, and despatched. It thus happens that a large

proportion of the contributions from the southern forests in the Bombay Presidency from Sind, Oudh, and Chittagong, and a portion of those from Madras and Assam could not be utilized for the Exhibition, because they arrived too late

"The difficulty was, in the short time available, to bring together seasoned pieces of the different species required Fortunately, a number of pieces collected between 1866 and 1870, from the North West and Central Provinces, the Punjab and British Burma, which had been kept at Calcutta until they should be required, were available Some of these pieces had decayed or been eaten by insects, but the remainder yielded a number of excellent and thoroughly seasoned specimens and it is remarkable how well many of the woods had kept in the damp climate of Calcutta The specimens yielded by these collections were numbered from 160 to 353

"From the Punjab a large, varied, carefully named and selected collection was sent by Mr Baden Powell, the Conservator, and the officers under his orders, the main series is numbered from 881 to 947, while those sent from the forests of Kulu, Kangra and Chamba, by Lieutenant Colonel Stenhouse and Mr Pengelly, are numbered, respectively, 116 to 132, 602 to 617, and 770 to 782[1]

"Besides these collections and those made by the undersigned in Simla, and already alluded to the Rev Mr Heyde of the Moravian Mission, Lahoul sent a number of most interesting specimens from the arid districts of the inner Himalaya (numbered 133 to 144 inclusive) and Mr F Halsey of Madhopur sent a small collection of fine, well seasoned pieces from the district of Gurdaspur (numbered 1190 to 1201)

"The contributions of Ajmere were not large enough to give timber specimens of the size required for the Exhibition, they were numbered from 437 to 472

"Mr Greig, the Conservator of Forests in the North Western Provinces, sent collections made by Messrs O Callaghan and Bagshawe and Captain Campbell in the forests of Dehra Dun, Jaunsar and Kumaun, they are numbered respectively 527 to 544 420 to 432 and 873 to 875 Larger collections had been made, but, as the logs were unseasoned, they were not sent down to Calcutta. From Oudh a few well-seasoned pieces were early received (Nos 387 to 394), but the remainder did not arrive till after the Exhibition specimens had left Calcutta

"The collections sent from Bengal under the orders of the Conservator, Dr W. Schlich, arrived with the exception of those from Chittagong, in very good time, and furnished a large number of interesting specimens from parts of the country the forest resources of which are not yet generally known Mr Richardson s contributions from the Sundarbans (Nos 395 to 419) illustrate well the forest growth of the delta of the Ganges and Brahmaputra, and those sent by Mr Chester from Chittagong (Nos 708 to 722, and 1951 to 1965) would have been of great interest had not the main series arrived too late But the chief collections received were sent by Messrs Johnston and Manson and the late Mr Bonham Carter from the Darjeeling Hills and Terai, numbering 170 pieces (Nos 354 to 385, 433 to 436, 473 to 500 573 to 601, 618 to 627, and 641 to 707), and including several very valuable and interesting kinds of timber Besides these a small collection of 14 specimens (Nos 964 to 976) was obtained by Dr Schlich from the valley of Chumbi, to the north of Sikkim, which, though to the south of the main Himalayan range, is actually in Thibet territory, and which had not hitherto been explored

"The collections from Assam sent by Mr Gustav Mann the Deputy Conservator, and by the Deputy Commissioners of Cachar and Sylhet included many fine and well-seasoned pieces These were numbered from 628 to 641, 783 to 799, 1228 to 1234, 1254 to 1277, 1285 to 1300—the last numbers arriving too late for the Exhibition

[1] Besides the numbers here given as indicating the specimens received from the Punjab and other provinces, there are a few scattered numbers which it has not been thought necessary to quote

"From the Central Provinces, the Conservator, Captain Doveton, sent a collection of well-seasoned pieces, numbering 1101 to 1186, procured by Mr. Richard Thompson from the Chanda forests.

"From Berar Mr. Drysdale, the Deputy Conservator, sent fine pieces of timber, numbered 820 to 844, and a valuable series of fibres, numbered 977 to 989.

"The contributions from the Bombay Presidency comprised a few pieces from Guzerat, Poona, and Ahmednagar, too small for cutting up, and a number of large pieces sent by Lieutenant-Colonel Peyton, the Conservator, and Mr. Barrett, the Deputy Conservator, from North Kanara, numbered 992, 993, 1217 to 1227: the latter, as well as the Sind specimens already referred to, and numbered 1379 to 1381, unfortunately arriving too late for the Exhibition.

"The collections sent from Madras were very full and complete. Those from the eastern side of the Presidency were sent by Colonel Beddome, the Conservator, and numbered from 1051 to 1100. Besides this collection a few logs and specimens of minor produce came from Gumsúr—the logs too late for cutting up. From the West Coast were received a large number of specimens, Nos. 723 to 769, 815 to 869, prepared by Mr. Cherry in South Kanara. From Malabar Mr. Ferguson, the officer in charge, sent a most interesting series of sections of young trees, illustrating the rapid growth of teak in the magnificent Conolly plantations at Nilambúr.

"The pieces received from Burma were not very numerous, though they comprised the most useful kinds of trees. Many of them were of very large size. The logs sent by Major Seaton, the Conservator at Moulmein, were numbered 515 to 551 and 1944 to 1950; while those from Mr. Ribbentrop, the Conservator at Rangoon, were from 555 to 572 and from 801 to 819.

"A most important collection was sent from the Andaman Islands by Major General Barwell, the Chief Commissioner. It consisted of 26 large logs (Nos. 501 to 526), besides numerous canes and bamboos."

It must not be supposed that because specimens were too late for the Exhibition that they were not utilized for the other distributed collections and for the descriptions given herein; on the contrary, they proved, several of them, most valuable for description, and especially those from Oudh, Sind, Gumsúr and Chittagong.

After the Exhibition collections had been despatched, by the kindness of the Superintendent of the Royal Botanic Gardens, a series of 100 Andaman Islands woods made in 1866 by Lieutenant Colonel Ford, M.S.C., at that time Superintendent of Port Blair, and which were accompanied by a carefully prepared bound catalogue, giving all the available information regarding quality and uses, was made available. This collection had been received in 1867, and, for better custody, had at that time been deposited in the Calcutta Gardens. Naturally, after ten years' storage in the moist climate of Calcutta, many of the specimens were found to be considerably damaged by decay or by the ravages of white-ants, but it was remarkable that so many species were found to be sound and to have sufficiently resisted those destructive agencies to be capable of furnishing good specimens for description and distribution. They are numbered B 2201 to B 2300, and an examination of the list

appended to this work will show what species in particular were fit for use A small hand collection was also received from the Salem District, Madras, and a small collection of Ceylon woods was available from the Inspector General's Office These were separately numbered and have been separately quoted

The chief contributors of further specimens for purposes of description were Colonel Beddome, Captain Bailey, R E, Messrs Ribbentrop, Thompson, Dodsworth, Smythies, Vincent, Johnston, Elliot, Oliver, Manson, Fuchs, Wilmot, all Forest Officers, as well as Dr. G King and Mr J F Duthie, the Superintendents of the Botanic Gardens at Calcutta and Saharunpur

Taking all these sources together, the number of specimens named, numbered, and described reaches 2,530, belonging to 906 species and 432 genera All the wood specimens described in this work bear a letter and a number, the numbers having been given in the order of receipt, and each number refers to the particular specimen or series of specimens cut out of one log or piece In this way there can be no mistake, any numbered specimen can be at once compared with its description in the book by means of its number, the index of numbers, and the list of specimens at the end of the description of each species It will be noticed that some of the serial numbers from 1 to 3636 are not represented in this work The reason is that when the Paris Exhibition collections were numbered the specimens of dyes, fibres, manufactured articles, etc, were also included, these, or most of them, have now been omitted, as well as such of the wood specimens as were in too bad a condition for description, or regarding the correct names of which any doubt was felt

The letter represents the region from which the specimen came For this purpose eight regions have been established, on the principle that the forests comprised in one region should possess a similar climate and a similar flora

The regions so established and the letters by which they are designated are—

H The North West Himalaya compris ng the mountains of that range above an elevation of 3 000 feet between the Indus and the Sardah river on the Nepal frontier

P The dry and arid region of the plains and lower hills of the Punjab Rajputana and Sind

O The plains and Sub Himalayan tract of the North West Provinces, Oudh and Gorakhpur ascending to 3 000 feet

C Central India the hilly country lying south of the J mna and north of the Godavery River, and including the Vindhia and Satpura Hills as well as Orissa

E. The North-East comprising the Himalaya from the Nepal frontier eastwards, the Khasia Hills, Assam, Cachar, Chittagong and the Sundarbans.
D. The Dekkan, comprising the country to the south of the Godavery, and chiefly included in Madras and Mysore.
W. The west coast of the peninsula, comprising the Western Ghâts and the country lying between them and the sea.
B. British Burma, including the Andaman Islands.

Exception might, perhaps, be taken to some points in this classification. The flora of Chittagong is, in reality, quite as closely allied to that of Burma as to that of Northern Bengal and Assam; while that of Orissa and Ganjam (Northern Circars) might, perhaps, have more correctly been classed with the flora of the Carnatic than with that of Central India. But the classification adopted is a convenient one, and was established by Dr. Brandis after very careful consideration and discussion. And it will be seen by a reference to the accompanying map, kindly furnished by Mr. H. F. Blanford, F.R.S., Meteorological Reporter to the Government of India, that the regions which we have designated by the eight letters, whose meaning we have just described, are really the regions which represent the different zones of comparative rainfall. The map, it will be seen, is coloured in four shades from white to dark blue, representing:—

1. The *Arid Zone* with a rainfall less than 15 inches.
2. „ *Dry Zone* „ „ of between 15 and 30 inches.
3. „ *Intermediate Zone* „ „ 30 and 70 inches.
4. „ *Moist Zone* „ „ of over 70 inches.

The first or *Arid Zone* covers only the north-western plains of the Punjab, Sind, and Rajputana; this, with a portion of the *Dry Zone*, to the north and east of it, constitute the region marked by the letter 'P'.

The *Dry Zone* has also two further areas in South India, that is in India south of the latitude of 21°; these areas, together with the portion of the *Intermediate Zone* on the east coast of the Peninsula south of the River Godavery and a narrow strip along the east of the range of the Western Ghâts, form the region which we have designated by the letter 'D'. It may, however, be remarked that Berar, from the similarity of its flora to that of the Central Provinces, is classed, though strictly speaking within the *Dry Zone*, under region 'C'.

The rest of the *Intermediate Zone*, forming quite half of the whole country, occupies a band stretching right across the head of the Peninsula, as well as a strip along the foot of the Great Himalayan Range. Though, comparatively speaking, this large area possesses a flora showing a general common likeness and similarity, yet we can easily divide it into two by considering the great sál belt between the foot of the Hima-

laya and the Ganges as one section, and the great main belt of sál passing into teak between that river and a southern boundary approximately represented by the river Godavery, as a second These two sections correspond to the regions represented respectively by the letters 'O' and 'C'

The *Moist Zone*, shown in the map in dark blue, occupies two main areas *first*, the great belt of the mountain ranges of northern and north-east India from Kashmir, through Nepal, Sikkim and Assam, to Chittagong and Burma, and, *second*, the narrow belt along the western coast This latter corresponds to the region we have marked 'W', while the former is divided into 3 sections, each having its characteristic flora These are—

1 The Himalayan region from Kashmir to the boundary of Nepal at the Sarda river in longitude about 81°
2 The Himalayan region from the Nepal boundary at the Mechi river in longitude nearly 88, the Assam Valley Khasia Hills, Cachar, and Chittagong, together with the Delta of the Ganges
3 Burma including the Andaman Islands

and are respectively represented by the letters 'H', 'E' and 'B'

So that, with trifling exceptions, the zones of rainfall and the regions represented by the letters prefixed to the numbers of the specimens agree with each other

As far as it was published, Bentham and Hooker's "Genera Plantarum" furnished the order in which the families were arranged, as well as the general nomenclature of genera and species At the time that most of the work was written (1878) the "Genera Plantarum" had only been published as far as the end of *Gamopetalæ* Since then the *Apetalæ* have been completed while the *Monocotyledons* may be expected to be published before long In almost all cases the names given in the "Flora Indica" have been taken, though there are a few exceptions in some of the genera in which it was considered best to use better known names, quoting always the names given in the "Flora Indica" as synonyms The "Flora Indica" is quoted as far as the end of the second volume, that is, to the end of *Cornaceæ* The third volume of the 'Genera Plantarum' and the third volume of the 'Flora Indica,' now in course of publication, have very considerably altered the genera and specific names of many of the plants whose woods are here described To have inserted these alterations either during the course of the printing, or as 'Corrigenda', would have caused considerable delay, and so the text remains as it was written. But when a new edition is published very great alterations will have to be made and

especially in some of the large orders like 'Lauraceæ,' which will have to be entirely remodelled. Generally speaking, the only books regularly quoted, are—

1. Hooker's Flora Indica.
2. Roxburgh's Flora Indica.
3. Brandis' Forest Flora of North-West and Central India.
4. Beddome's Flora Sylvatica of the Madras Presidency.
5. Kurz's Forest Flora of British Burma.
6. Gamble's Trees, Shrubs and Large Climbers of the Darjeeling District.

The last-mentioned work being referred to merely as indicating that the tree in question is found in the North-East Himalaya, in the same way as Brandis' Forest Flora shows that the tree is found in North-West and Central India; Beddome's Flora that it occurs in Madras; Kurz's Forest Flora that it is a native of Burma.

A list of other works from which information has been drawn is appended to this introduction, and it must always be borne in mind that, excepting the actual descriptions of the woods, very little of what is here given is new, but has been compiled from all available sources of information. In this way the chief points of information here recorded under each species are—

1. The scientific name—with synonyms, so far as the six books referred to above are concerned.
2. The vernacular names—selected with as much care as possible and with the spelling given according to the most ordinary system and the pronunciation of the word.
3. The description of the wood.
4. The geographical distribution, as shortly as possible.
5. The record of all available information regarding rate of growth.
6. The results of all experiments on weight and strength that it was possible to quote.
7. The uses to which the wood and other products of the tree are generally put.
8. The list of specimens used in identification and description.

To have added also a botanical description of the plant, as is done in Mathieu's "Flore Forestière" would have doubtless increased the value of the work, but it would have at least doubled its size; and, in the present state of our knowledge of the Indian Flora, would have been almost impossible. Besides, as has been already explained, the number of species of which the woods have been described is only a small proportion in reality of the total number of species of woody plants inhabiting India. But some attempt has been made to notice even the species which have not been described. In some important genera, a list of known species and their geographical habitat has been given, in other genera other species of note have been mentioned, and, whenever possible, notes regard-

ing the uses and qualities of the wood and the other products of the trees so referred to have been added One great object in having thus mentioned other species has been kept in view, *viz*, to show Forest Officers and others who may have the opportunity, *what we have not got*, and so persuade them to help, by sending to the writer or to the Forest School Museum, specimens that can be described and help at some future time in the publication of a more correct and complete description of the Indian woods than can now be attempted In a few cases where most of the species are well known, as, for instance, the Maples, an attempt at an analytical key by which the species may be roughly determined in the forests has been given In the French Forest Flora this has been done for all species, and the different Indian Forest Floras have similar analyses, but they are all dependent on more or less difficult botanical characters, while what we chiefly require is a series of keys which shall enable a non botanical Forest Officer to ascertain the species of the tree he meets with, by means of the more conspicuous differences in habit, bark, and leaf

It is now necessary to explain how the descriptions of the woods were made During the progress of the work of preparation of specimens in Calcutta, and afterwards at more leisure in Simla, the examination of the different woods and their description was made by a committee which consisted of—

1 Dr D Brandis F R S, C I E Inspector General of Forests
2 Mr J S Gamble M A Assistant to the Inspector General of Forests
3 Mr A Smythies, B A Assistant Conservator of Forests Central Provinces

The descriptions were usually dictated by Dr Brandis, and written down by one of the others, generally Mr Smythies, but the wood structure was examined by all three officers and discussed before the description was finally passed The whole was gone over three or four times, and in the later examinations, when the Committee was more accustomed to the differences of structure, the generic and family characters were discussed and drawn up Some of the later received specimens, as well as those given in 'Addenda,' were described by the writer, but on the same plan and principle as was originally adopted by the Committee

In the description of the woods the chief characters of which note has been given are —

1 Size of tree
2 Evergreen or deciduous
3 Description of bark—
   a Colour
   b Thickness
   c Appearance and fissures, exfoliation

4. Description of wood (sapwood and heartwood)—
   a. Colour.
   b. Hardness.
   c. Grain.
5. Annual rings.
6. Pores.
7. Medullary rays.
8. Other characters, such as the presence or absence of concentric markings.

and these characters require a short explanation.

1. *Size.*—The plants are usually described as "shrubs", "large shrubs", "small trees", "trees", "large trees", and "very large trees", according to general size; or as "climbing" or "straggling plants".

2. *Evergreen or Deciduous.*—These characters are given as far as our knowledge of the trees extends, and are easily understood.

3. *Bark.*—Is described according to its colour, which usually presents some shade of grey or brown, varying into white, or red, or black; its thickness represented by the fractions of the inch; its roughness or smoothness, and the fissures and clefts into which it is cut externally; its texture whether hard or soft, papery or corky; and the way in which it exfoliates.

4. *Wood.*—The wood is described whenever possible according to both sapwood and heartwood. The *colour* is given as nearly as possible according to the shades, usually of white or brown, but varying into red, grey, yellow, purple and black. The *hardness* is given according to the different categories as 'extremely soft", "very soft", "soft", "moderately hard", "hard", "very hard", and "extremely hard", and in order to give an idea of these different categories we may instance the following among well-known trees:—

Extremely soft . . .	*Cochlospermum Gossypium.*
Very soft . . .	*Sterculia villosa; Bombax malabaricum.*
Soft . . .	*Cedrela Toona; Albizzia stipulata.*
Moderately hard . .	*Ficus bengalensis; Tectona grandis.*
Hard . . .	*Shorea robusta; Terminalia tomentosa.*
Very hard . . .	*Dalbergia Sissoo; Quercus semecarpifolia.*
Extremely hard . .	*Pterocarpus santalinus; Hardwickia binata.*

The *grain* is usually recorded as being "close", "even", "open", "rough", "cross", &c., &c., and the relative roughness or smoothness is generally given.

5. *Annual rings.*—In the description of the wood these are only referred to as regards their presence or absence, their being more or less well marked, and the marks which so distinguish them.

6. *Pores.*—As in the case of the hardness, so, too, the pores are described according to a scale of size which varies in those trees which possess them, as "extremely small", "very small", "small", "moderate

sized", "large", "very large", and "extremely large" As examples of these categories may be given—

Extremely small	*Buxus sempervirens*
Very small	*Acer pictum*
Small	*Adina cordifolia*
Moderate sized	*Bassia latifolia*
Large	*Albizzia Lebbek*
Very large	*Erythrina suberosa.*
Extremely large	Many climbers,

7 *Medullary rays* —The classification of the medullary rays has been made upon a similar plan, and they have been divided into "extremely fine", "very fine", "fine", "moderately broad", "broad", "very broad", and "extremely broad", examples of which categories are—

Extremely fine	*Euonymus lacerus*
Very fine	*Diospyros Melanoxylon*
Fine	*Albizzia Lebbek*
Moderately broad	*Dillenia pentagyna*
Broad	*Platanus orientalis*
Very broad	*Quercus incana*
Extremely broad	*Samara robusta*

In addition, the distance between the medullary rays is usually given and is compared with the diameter of the pores The medullary rays are said to be *distant* when they are further apart than twice the diameter of the pores, and in some species they are closer together than that diameter, often bending round the pores which come between them

8 *Other characters* —The most noticeable of these are the presence or absence of concentric bars across the rays, and of patches of white tissue and the way they are disposed These other characters are often valuable accessaries in determining the genera, and even the family to which a wood belongs The woods of different species of ANONACEÆ are all characterised by regular ladder like transverse bars, and so far as the experience gained in the preparation of this work goes, the character affords an unmistakeable sign for recognizing the trees of that order

In SAPOTACEÆ again, the wavy concentric lines and the arrangement of the pores in short wavy lines affords a character which is almost certain, and if any doubt could arise it would be between that order and its neighbour the EBENACEÆ, which, however, almost always differs in having the wood of a white, grey or black colour, while that of SAPOTACEÆ is generally some shade of red

Concentric lines of soft texture occur in many families and genera They are very common in the LEGUMINOSÆ, as may be seen from the description of the seven groups which the woods of that family form, as described at pages 115, 116 They occur also in *Garcinia* and *Mesua*

among GUTTIFERÆ; in *Elæodendron*, *Celastrus*, and *Lophopetalum* among CELASTRINEÆ; in *Heynea*, *Amoora*, and *Walsura* among MELIACEÆ; *Cordia* in BORAGINEÆ, and in other genera. The wood of the trees of the great and important order of CONIFERÆ is always recognizable, at any rate, by the constant character of the absence of pores; that of the CUPULIFERÆ by the arrangement of the pores in wavy, radial lines, and a particular texture; somewhat broad medullary rays often indicate the orders DILLENIACEÆ, RHIZOPHOREÆ, and MYRSINEÆ; a close and even-grained wood, most species of the great order of RUBIACEÆ; while the large genus *Ficus* has its woods extremely uniform in character and recognized by alternate layers of soft and firm tissue.

In this way a little practice enables a very near guess to be made at the scientific name of the tree which gave any wood which it may be necessary to determine, and it may be hoped that, with a rather wider acquaintance with the woods of India, we may be in a position to draw up an analytical table for the woods which are most chiefly in use in India, similar to that given at the end of the French Forest Flora.

Mention has been made of some families and genera which have woods of similar character and structure, but it is also necessary to point out that there is no regular rule for determining orders and genera by means of the wood, for in some cases the structure of the different component genera or species presents characters of a very dissimilar type. In the genus *Dalbergia*, for instance, there is a very great dissimilarity, so that while three species (see p. 124) have hard dark-coloured heavy woods, others have white, often soft, woods without heartwood, and one species has the peculiarity of a wood divided into concentric rings, which are often separable, of alternate layers of wood and bark-like tissue.

But, in general, it may be said that in the same genus the wood structure is usually constant, and in this way the character may often serve as a valuable aid in botanic investigation, as it has constantly done in palæontology.

It is not always easy to give in words an explanation of the reasons which lead one who is tolerably conversant with the structure of woods to pronounce an opinion; there are often characters of appearance, touch, colour, odour, &c., which afford clues, as well as the arrangement and relative size of the pores and medullary rays, and the presence or absence of annual rings; so that it is really only experience and habit that can teach us to recognize, from a mere inspection of a wood, the place which it ought to occupy in the natural system.

As an instance of how the structure of a wood may bear out an opinion

on generic distinction the following may be given When describing the woods of the different species of Olive, one kind was met with which presented a structure entirely dissimilar from the rest This was our No E 379 which was sent, accompanied by leaf specimens, from the higher forests of Sikkim Wishing to ascertain the name, Dr Brandis took the specimens to the Calcutta Herbarium, and after careful examination pronounced them to belong to a species of *Osmanthus*, a genus closely allied to *Olea*, and it is as *Osmanthus*, nov sp, that the wood is described at p. 257 A few days ago, in the forest near Darjeeling the writer found trees of the well known *Osmanthus fragrans*, and on examining the wood, found that it agreed in structure with No E 379, having the pretty network of anastomosing bands of pores, and not the more regular and uniform arrangement presented by *Olea* So that the correctness of Dr Brandis' determination is borne out by the structure of the wood at any rate

The examination of specimens to determine the *rate of growth* was chiefly made by Mr Smythies, assisted at one time by Dr Warth, and, in writing the account of rate of growth, reference has been made to all the information published, or otherwise obtainable, on the subject For the principal woods some data have been procured which will doubtless be very valuable, while even the record of the countings made on our small specimens is, though not absolutely reliable, at any rate useful as a commencement Whenever possible, countings were made on the log, on the whole diameter of the section, but time and leisure were not always available for this during the work in Calcutta, so that many of the results given are merely calculated from an inspection of such pieces as were available, and are necessarily, therefore, not completely reliable This explanation is necessary, in order that it may be well understood, that our record is not always a record of the results of a series of carefully conducted experiments and examinations, but in many cases is only given as a beginning and as being the best information available

The discussion of the rate of growth of teak was based on a memorandum which was published by Dr Brandis on the subject and circulated, that of sal was chiefly drawn up by Mr Smythies, and appeared first in Vol IV, page 324, of the *Indian Forester*, the rest were drawn up by the writer Information regarding the rate of growth of our forest trees is one of the greatest of our desiderata, as such information is essential to the determination of the rotation of forests and the construction of working plans, so that no possible opportunity should be lost of collecting information on the subject

The rate of growth is recorded as "slow", "moderate", or "fast", according as the number of rings per inch is greater than 12, between 12 and 6, and less than 6. These correspond to ages at 6 feet in girth of 134 years, 67 to 134, and 67 years respectively.

Weight.—As already stated in reference to the annual rings, the experiments made with our specimens in ascertaining the specific gravity of different kinds of woods, are also merely given as being often the only information available. Most of the specimens weighed were of small size, and they were, perhaps, not always cut so as to be capable of very exact measurement, but, nevertheless, the information obtained is of value and can serve until it is supplemented or superseded by more accurate experiments made with a large choice of specimens.

The weighings were done by Mr. Smythies and Dr. H. Warth, and the result is given in the form of the number of pounds per cubic foot, as being a more easily utilized form of information than the figures representing the specific gravity, compared with that of water taken as 1. The weight here recorded is always, unless otherwise stated, that of seasoned timber, and it is given as "light", "moderately heavy", "heavy", and "very heavy" according as the woods give:—

Light, less than 30lbs. per cubic foot.
Moderately heavy, from 30lbs. to 50lbs. per cubic foot.
Heavy, from 50lbs. to 70lbs. per cubic foot.
Very heavy, over 70lbs. per cubic foot.

As in the Forest Flora of North-West and Central India, only the information regarding the *transverse strength* of timber is recorded, though in a few cases the modulus of elasticity is also given.

In regard to *transverse strength,* the value of P is the result obtained by the formula—

$$\frac{W \times L}{B \times D^2}$$

where—

W=The breaking weight, or the weight which when placed on the middle of the bar causes it to break.
L=the length of the bar between supports, in feet.
B=the breadth of the bar, in inches.
D=its thickness, in inches.

A great number of recorded experiments have been brought together, chiefly from those made by Baker, Skinner, Benson, Bennett, Dundas, and others, while in these pages are for the first time published the results of the valuable and careful experiments made in Calcutta by Dr. Brandis in 1864.

In writing the remarks on the *products* of each tree, the uses for which its wood is valuable, and the various economic purposes to which the bark, fibre, gum, fruit, leaves, &c, are put, information has been extracted from a very large series of books and papers, official documents and notes furnished by the [illegible] tion In fact, almost all [illegible] sulted in order to make the remarks as complete as possible But there is still much to be done, every day adds some new fact to the stores of our information regarding Indian trees, and the Departmental Reports, the *Indian Forester*, and the various publications of Government on the different subjects of economic interest, the dyes, fibres, gums, oils, &c, are constantly still increasing this information, so that before long even the more recently added items will become old in their turn As our knowledge of Indian trees and their uses and capabilities extends, and as specimens are obtained and wood structures described, so it is hoped that facts may be collected which will enable some future Forest Officer to revise and republish this work, bringing it up to date and making more wide the area of our knowledge of the wonderful productions of the very varied forest flora of India It may be called ambitious to attempt a description, even in the shape of a 'Prodromus,' of the woods of such a wide field as that of British India, but the difficulty would always be, in attempting to restrict the area, that the various floras of the different regions run so much into one another, and so often contain the same or similar species, so that it may be hoped that the publication of this work, which, except as regards the wood structure alone, is only after all a compilation, will be looked upon chiefly as an attempt to describe the principal woods of India, and in a less degree as a convenient book of reference for the native names and economic uses of Indian trees

The Addenda Corrigenda sheets are rather lengthy, but the number of corrected mistakes is not very great, the chief reason for length being the addition of descriptions of woods lately obtained and of native names not before published The Kol names for instance, it is believed, are herein published for the first time these, as well as a few Oraon, Bhumij and Kharwar names, were collected by the writer in the winter of 1880 81, and he has also added a number of Uriya names obtained in the forests of Khurda, and Magh and Bengali names obtained in Chittagong The Mechi and Garo names attached to Mr Shakespear's collections in the Bengal Forest Herbarium have also been added, as

well as the Mysore names published recently by Major VanSomeren. Some further information regarding the rate of growth has also been given.

J. S. GAMBLE.

DARJEELING:
November, 1881.

LIST OF BOOKS AND PUBLISHED PAPERS REFERRED TO

Anderson An Enumeration of the Palms of Sikkim Journal of the Linnean Society of London, 1868

——— An Enumeration of the Indian Species of Acanthaceæ Journal of the Linnean Society of London, 1866

Atkinson Economic Products of the North Western Provinces 'Gums and Gum resins' Allahabad, 1876

Baden Powell Hand book of the Economic Products of the Punjab, Roorkee, 1868.

Baker Experiments on the Elasticity and Strength of Different Kinds of Timber Gleanings in Science, 1829

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Beddome Flora Sylvatica of the Madras Presidency, Madras, 1869 73

———. Report on the Nilambur Teak Plantations, Madras, 1878

Bennett Experiments on Andaman woods Professional Papers on Indian Engineering, Roorkee

Bentham and Hooker Genera Plantarum, Vols I and II

Bidie Report on Neilgherry Loranthaceous Plants Madras, 1874

Brandis Forest Flora of North West and Central India, London 1874

——— List of Specimens of the Woods of British Burma sent to England for the International Exhibition of 1862, Calcutta, 1878

——— Catalogue of Specimens sent to the Paris Exhibition of 1878, Calcutta, 1878

Brandis and others Report on the Deodar Forests of Bussahir, 1865

——— Working Plan for the Bias Forests, 1871

——— Working Plan for the Deoban Working Circle, 1875

——— Preliminary Working Plan of the Sutlej Working Circle, 1875

———. Suggestions regarding the Demarcation and Management of the Forests of Kulu, 1877

Brandis Suggestions regarding Forest Administration in the Central Provinces, 1876

——— Suggestions regarding Forest Administration in the Hyderabad Assigned Districts, 1877

——— Suggestions regarding Forest Administration in Assam 1879

——— Suggestions regarding Forest Administration in Ajmere and Merwara, 1879

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Gamble. List of the Trees, Shrubs, and Large Climbers of the Darjeeling District, Calcutta, 1878.

Griffith. The Palms of British East India, Calcutta, 1850.

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Kurz. Report on the Vegetation of the Andaman Islands, Calcutta, 1870.

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Ribbentrop. Hints on Arboriculture in the Panjab, Calcutta, 1874.

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Thwaites Enumeratio Plantarum Zeylaniæ, London, 1864

Van Someren List of the Forest Trees of Mysore and Coorg

Wallich Plantæ Asiaticæ Rariores, London, 1830

—— List of Indian Woods collected by — By A Aikin Transactions of the Society of Arts 1839

Waring Pharmacopœia of India, London, 1868

Watson List of Indian Products, London, 1872

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Wight Icones Plantarum Indiæ Orientalis, Madras, 1840 1853

—— Illustrations of Indian Botany, Madras 1838—53

Also numerous papers in the *Indian Agriculturist, Statistical Reporter, Indian Forester* and other periodicals

ADDENDA AND CORRIGENDA.

Page 1, last line but 6 *For* "H 2850 ' *read* "H 2820'

" 2, line 7 *After* "Andamans.' *add* "It has a red bark peeling off in hard flakes, light brown, moderately hard wood, with large round pores and broad medullary rays (E 3370 Kasalong Reserve, Chittagong)'

" 2, *Dillenia indica* To vernacular names *add* "*Ramphal*, Nep , *Panpui*, Garo, *Betta kanagala, kad kanagala*, Kan , *Chilta*, Monghyr, *Oao*, Uriya,"

" 2, line 6 from the bottom, *after* 'radius' *add* "A round (E 2310) in the Bengal Forest Museum shews 62 rings for a mean radius of 6½ inches, or nearly 9 rings per inch'

" 3, line 4 *Add* "The leaves are said by Mr Brownlow of Cachar to be used for feeding the silkworm *Attacus Atlas*'

" 3, *D pentagyna* To vernacular names *add* "*Pashkouli*, Rajbanshi, *Agar*, Monghyr, *Uchki*, Garo, *Korkot*, Oraon, *Korkotta*, Kól, *Kaltega, kad kanagala*, Kan ,"

" 3, *D pentagyna* To numbers *add*—

"C 3571 Khurdha Forests, Orissa . . 49 lbs."

" 5, *Talauma Hodgsoni* To vernacular names *add* "*Laigongron*, Mechi, *Pankakro*, Gáro,"

" 5 *Magnolia Campbellii* Before vernacular names *add* "Red Magnolia' and to vernacular names *add* "*Patagari*, Bhutia,"

" 6, *Michelia Cathcartii* To numbers *add*—

"E 3321 Darjeeling, 6 500 ft"

" 6, *M excelsa* To vernacular names *add* "*Pendre*, Lepcha,"

" 7, line 2 *After* "specimens' *add* "Young specimens cut in the Park, Darjeeling, shew 4 to 7 rings per inch of radius, while a large round (E 3631) in the Bengal Forest Museum, having a girth of 91 inches, shows 7 rings per inch mean growth'

" 7, *M excelsa.* To numbers *add*—

"E 3586 Darjeeling 7,000 ft"

" 7, line 18. *After* "growth moderate' *add* "6 rings per inch of radius '

" 7, *M lanuginosa* To numbers *add*—

"E 3331 Darjeeling, 6 000 ft . . . . 36 lbs '

" 9, *Polyalthia cerasoides* To vernacular names *add* "*San hessare*, Kan,

" 9 *After* POLYALTHIA *add* "C 3483, from the Kolhan Forests, Singbhúm Chota Nagpore is probably *P suberosa*, Roxb Vern *Sandi omé*, Kól Bark thick, brown Wood olive grey, hard, close grained, resembling that of *P. cerasoides*

" 10, *Saccopetalum tomentosum* To vernacular names *add* "*Omé, hake humú* Kól, *Hessare*, Kan , '

Page 10, *S. tomentosum.* To numbers *add*—

"C 3471., Saranda Forests, Chota Nagpore."

" 10. *After* SACCOPETALUM above the 12th line from the bottom of the page, *add*—

"C 3536, from the Khurdha Forests, Orissa. Vern. *Patmossu*, Uriya, resembles the wood of *Saccopetalum tomentosum*, but is whiter. Weight, 51 lbs. per cubic foot."

"E 3368, from the Kasalong Reserve, Chittagong, is *Unona longiflora*, Roxb. Fl. Ind. ii. 668; Hook. Fl. Ind. i. 61; Kurz i. 35, a small tree of Assam, the Khasia Hills, and Chittagong. Bark greenish-grey, thin, smooth. Wood yellowish white, moderately hard, close-grained. Pores small, scattered, scanty. Medullary rays moderately broad, joined by numerous white transverse bars.

"B 3380, from the hills to the east of Toungoo, British Burma, is *Mitrephora vandæflora*, Kurz i. 45, a tree of the forests of Chittagong and Pegu, but chiefly found in the Martaban Hills. The wood is grey, moderately hard. Pores small to moderate-sized, not numerous. Medullary rays moderately broad, joined by numerous, regular, white transverse bars.

"E 3300, from Chunbati, Darjeeling, 2,000 ft., is *Goniothalamus sesquipedalis*, Hook. f. and Th.; Hook. Fl. Ind. i. 73; Kurz i. 41; Gamble 3. Vern. *Sané*, Nep.; *Singnok*, Lepcha, a small shrub of the Eastern Himalaya down to Burma. Bark black. Wood dark grey, soft. Pores extremely small. Medullary rays fine to moderately broad, wavy. Transverse bars very numerous, very fine."

" 11, line 5. *After* "B 273." *add* "B 276."

" 13, " 26. *For* "52 lbs." *read* "55 lbs."

" 13, " 29. *For* "Naghanda" *read* "Nagkanda"

" 15. *After* "**2. C. aphylla**" *add*—

"**3. C. horrida**, Linn. f.; Hook. Fl. Ind. i. 178; Brandis 15; Kurz i. 62. *C. zeylanica*, Roxb. Fl. Ind. ii. 567. Vern. *Hís, karvila*, Pb.; *Karralura*, Oudh; *Adonda*, Tel.; *Katerni*, Gondi; *Gitoran*, Ajmere; *Bagnai*, Monghyr; *Atanday*, Tam.; *Oserwa*, Uriya.

"A climbing thorny shrub. Bark ¼ inch thick, brown, rough. Wood yellowish white, moderately hard. Pores small to moderate-sized, scanty. Medullary rays moderately broad, not numerous, short. Faint, wavy, concentric lines of soft tissue.

"Most parts of India and Burma.

"P 3244. Ajmere . . . . 47 lbs.

"**4. C. multiflora**, Hook. f. and Th.; Hook. Fl. Ind. i. 178; Kurz i. 61; Gamble 5. Vern. *Suntri*, Nep.

"A climbing thorny shrub. Bark smooth, dark. Wood white, moderately hard. Pores small, scanty. Medullary rays short, fine, Faint concentric lines of softer texture.

"Eastern Himalaya, Upper Burma.

"E 3349. Nagri, Darjeeling, 4,000 ft.

"**5. C. olacifolia**, Hook. f. and Th.; Hook. Fl. Ind. i. 178; Gamble 5. Vern. *Naski, hais*, Nep.; *Jhenok*; Lepcha.

"A thorny shrub. Bark ¼ inch thick, brown, rough, corky. Wood white, hard. Pores small, often subdivided, or in radial lines. Medullary rays fine, very numerous.

"Sub-Himalayan tract from Nepal to Assam, chiefly in the undergrowth of Sissú forests, along rivers.

"E 3297. Balasun, Darjeeling Terai . . . 44 lbs.

"6. C sepiaria, Linn, Hook Fl Ind i 177, Brandis 15, Roxb Fl Ind ii 563, Kurz i 66 Vern *Hiun gaina*, Pb, *Kanti kapali*, Uriya

"A shrub Bark brown, ⅛th inch thick Wood white, hard Pores moderate sized, scanty Medullary rays short, fine Faint, white, concentric bands

"Dry places in India and Burma

"P 3242 Ajmere

"C 3580, from Khurdha, Orissa, is this species The wood resembles that of the Ajmere specimen, but the medullary rays are moderately broad and longer '

Page 15, *Cratæva religiosa* To vernacular names *add* "*Tiiladu, bunboronda*, Mechi, *Nirujani*, Coorg, '

„ 16, line 22 *For* "moderately fine" *read* "moderately broad

, 16, „ 32 *After* '*Latkan*,' *add* "*natkana*,"

„ 16, „ 33 *After* "*Kuppa manhala*, *add* "*rangamali*,'

, 16, „ 13 from the bottom. *Add after* "Nilgiris "*Sanna solti*, Hassan,'

, 16, „ 7 from the bottom *Before* "*Flacourtia*' *add* "*Bixa*,

, 16, last line but one. *For* "Kuntto' *read* "Kunth'

„ 17, *Cochlospermum Gossypium* To vernacular names *add* "*Hupu*, Kol, *Betta tovare*, Kan, *Konto palas*, Uriya,'

„ 17, line 17 *After* "Burghers,' *add* "*Dodda jepalu*, Kan

, 18, *Flacourtia Ramontchi*. To vernacular names *add* '*Serali, merlo*, Kol, *Katail*, Palamow, *Bali baincho*, Uriya, and to numbers *add* "C 3453 Saidope Reserve, Palamow, Chota Nagpore, and "C 3488 Kolhan Forests, Singbhum, Chota Nagpore '

„ 18, at the end of Flacourtia *after* line 18 *add* "C 3519, from the Khurdha Forests, Orissa, is *Flacourtia sepiaria*, Roxb Vern *Baincha, bainch koli*, Uriya Bark yellowish red, thin Wood light red, hard, close and even grained Pores very small in radial lines between the very fine, uniform, closely packed, wavy medullary rays"

„ 18, line 31 *For* "H 2947. *read* "H 2949

„ 18, line 32 *After* "Assam *add* "Chota Nagpore '

„ 18, at the bottom of the page, *add* "[illegible]
of *Bixa Orellana*, Linn [illegible]
white, soft, even grained. [illegible]
3 to 6, prominent on a vert[illegible]
packed, bent round the pores or groups of pores, so that the distance between the rays is less than the transverse diameter of the pores Annual rings marked by a line without pores Growth moderate 5 rings per inch of radius '

, 19, Order XI Polygaleæ At the end *add* "No E 3393 is *Polygala arillata*, Ham, from Jalapahar, Darjeeling, 7,500 ft It has a thin grey bark, and white, soft wood Pores small, arranged in radial, or sometimes oblique, lines or patches Medullary rays fine, scanty Annual rings distinct

„ 20, heading *For* "*Tamarix*" *read* "*Tamarix*

„ 21, line 11 from the bottom *After* "*Kirballi*' *add* "*ballagi*,'

„ 23, „ 22 *After* "*Mataw*, Burm *add* "*Divarige*, Kan,

„ 24, *Garcinia Cambogia* To vernacular names *add* "*Manthulli*, Kan

, 24, *G Morella* To vernacular names *add* "*Kankutake*, Kan,

„ 24 *After* "4 G Morella ' above line 8 from the bottom, *add*—

"5 G stipulata T And, Hook Fl Ind i 267, Gamble 7 Vern *Sunakadan*, Lepcha

Page 10, *S. tomentosum.* To numbers *add*—

"C 3471. Saranda Forests, Chota Nagpore."

„ 10. *After* SACCOPETALUM above the 12th line from the bottom of the page, *add*—

"C 3536, from the Khurdha Forests, Orissa. Vern. *Patmossu,* Uriya, resembles the wood of *Saccopetalum tomentosum,* but is whiter. Weight, 51 lbs. per cubic foot."

"E 3368, from the Kasalong Reserve, Chittagong, is *Unona longiflora,* Roxb. Fl. Ind. ii. 668; Hook. Fl. Ind. i. 61; Kurz i. 35, a small tree of Assam, the Khasia Hills, and Chittagong. Bark greenish-grey, thin, smooth. Wood yellowish white, moderately hard, close-grained. Pores small, scattered, scanty. Medullary rays moderately broad, joined by numerous white transverse bars.

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„ 11, line 5. *After* "B 273." *add* "B 276."

„ 13, „ 26. *For* "52 lbs." *read* "55 lbs."

„ 13, „ 29. *For* "Naghanda" *read* "Nagkanda"

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"**3. C. horrida,** Linn. f.; Hook. Fl. Ind. i. 178; Brandis 15; Kurz i. 62. *C. zeylanica,* Roxb. Fl. Ind. ii. 567. Vern. *Hís, karvila,* Pb.; *Karralura,* Oudh; *Adonda,* Tel.; *Katerni,* Gondi; *Gitoran,* Ajmere; *Bagnai,* Monghyr; *Atanday,* Tam.; *Oserwa,* Uriya.

"A climbing thorny shrub. Bark ¼ inch thick, brown, rough. Wood yellowish white, moderately hard. Pores small to moderate-sized, scanty. Medullary rays moderately broad, not numerous, short. Faint, wavy, concentric lines of soft tissue.

"Most parts of India and Burma.

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"**4. C. multiflora,** Hook. f. and Th.; Hook. Fl. Ind. i. 178; Kurz i. 61; Gamble 5. Vern. *Suntri,* Nep.

"A climbing thorny shrub. Bark smooth, dark. Wood white, moderately hard. Pores small, scanty. Medullary rays short, fine, Faint concentric lines of softer texture.

"Eastern Himalaya, Upper Burma.

"E 3349. Nagri, Darjeeling, 4,000 ft.

"**5. C. olacifolia,** Hook. f. and Th.; Hook. Fl. Ind. i. 178; Gamble 5. Vern. *Naski, hais,* Nep.; *Jhenok,* Lepcha.

"A thorny shrub. Bark ¼ inch thick, brown, rough, corky. Wood white, hard. Pores small, often subdivided, or in radial lines. Medullary rays fine, very numerous.

"Sub-Himalayan tract from Nepal to Assam, chiefly in the undergrowth of Sissú forests, along rivers.

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"6. C **sepiaria**, Linn, Hook Fl Ind i 177, Brandis 15, Roxb Fl Ind ii 568, Kurz i. 66. Vern *Hiun gaina*, Pb, *Kanti kapali*, Uriya.

"A shrub Bark brown, ⅛th inch thick Wood white, hard Pores moderate sized, scanty Medullary rays short, fine Faint, white, concentric bands

"Dry places in India and Burma.

"P 3242 Ajmere.

"C 3580, from Khurdha, Orissa, is this species The wood resembles that of the Ajmere specimen, but the medullary rays are moderately broad and longer"

Page 15, *Cratæva religiosa* To vernacular names *add* "*Tuladu, bunboronda*, Mechi, *Nirujani*, Coorg,"

" 16, line 22 *For* "moderately fine" *read* "moderately broad"

" 16, " 32. *After* "*Latkan*," *add* "*natkáná*,"

" 16, " 33 *After* "*Kuppa manhala*," *add* "*rangamali*,"

" 16, " 13 from the bottom. *Add after* "Nilgiris" "*Sanna solti*, Hassan,"

" 16, " 7 from the bottom *Before* "*Flacourtia*' *add* "*Bira*,"

" 16, last line but one. *For* "Kuntto" *read* "Kunth"

" 17, *Cochlospermum Gossypium* To vernacular names *add* "*Hupu*, Kól, *Betta tovare*, Kan, *Konto palas*, Uriya,"

" 17, line 17. *After* "Burghers," *add* "*Dodda jepalu*, Kan"

" 18, *Flacourtia Ramontchi*. To vernacular names *add* "*Scrali, merlo*, Kól, *Katail*, Palamow, *Bali baincho*, Uriya," and to numbers *add* "C 3453 Saidope Reserve, Palamow, Chota Nagpore,' and "C 3488 Kolhân Forests, Singbhúm, Chota Nagpore"

" 18, at the end of FLACOURTIA *after* line 18 *add* "C 3519, from the Khurdha Forests, Orissa, is *Flacourtia sepiaria*, Roxb Vern *Baincha, bainch koli*, Uriya Bark yellowish-red, thin Wood light red, hard, close and even grained Pores very small, in radial lines between the very fine, uniform, closely-packed, wavy medullary rays"

" 18, line 31. *For* "H 2947.' *read* "H 2949"

" 18, line 32. *After* "Assam" *add* "Chota Nagpore"

" [illegible]

packed, bent round the pores or groups of pores, so that the distance between the rays is less than the transverse diameter of the pores. Annual rings marked by a line without pores Growth moderate · 5 rings per inch of radius."

" 19, Order XI. POLYGALEÆ At the end *add* "No E 3393 is *Polygala arillata*, Ham, from Jalapahar, Darjeeling, 7,500 ft It has a thin grey bark, and white, soft wood Pores small, arranged in radial, or sometimes oblique, lines or patches Medullary rays fine, scanty. Annual rings distinct'

" 20, heading *For* "*Tamarieæ*" *read* "*Tamarix*"

" 21, line 11 from the bottom *After* "*Kirballi*," *add* "*ballagi*,"

" 23, " 22 *After* "*Mataw*, Burm" *add* "*Diarige*, Kan,'

" 24, *Garcinia Cambogia* To vernacular names *add* "*Manthulli*, Kan."

" 24, *G Morella* To vernacular names *add* "*Kankutake*, Kan,"

" 24 *After* "4 **G Morella**,' above line 8 from the bottom, *add*—

"5 **G stipulata**, T And., Hook Fl Ind i 267, Gamble 7. Vern *Sanakadan*, Lepcha

"A tree with brown bark. Wood light orange-yellow, moderately hard, close-grained. Pores moderate-sized, sometimes subdivided. Medullary rays moderately broad, numerous. Numerous wavy concentric bands of soft texture, and of colour lighter than the rest of the wood, across the rays, and often anastomosing.

"Sikkim and Bhutan in damp forests up to 4,000 ft.

"The fruit is yellow and sometimes eaten by Lepchas. It gives a yellow gum, chiefly from the fruit, but it does not seem to be used.

"E 3352. Kalimpung, Bhutan, 4,000 ft.

"E 3365 is a specimen of the wood of a *Garcinia* from Burkhal, Chittagong Hill Tracts. Bark thin, brown. Wood reddish white, moderately hard. Pores large, scanty, often subdivided. Medullary rays fine to broad. Numerous, wavy, concentric bands of soft tissue across the rays."

Page 25, line 16. *For* "are found" *read* "they are found"

„ 25, *Calophyllum inophyllum.* To vernacular names *add* "*Pinekai,* Kan.; *Poonang,* Uriya;"

„ 25, line 10 from the bottom. *Add* "Sebert in 'Les Bois de la Nouvelle Calédonie' says it is a magnificent wood for cabinet-maker's work, and that it gives a yellowish green, pleasantly scented resin. He gives the mean specific gravity as 0·924, equivalent to nearly 59 lbs. per cubic foot. In Orissa it is much cultivated, and an oil extracted from the seeds is used for burning."

„ 26, *C. tomentosum.* To vernacular names *add* "*Kuve, bobbi,* Kan.;"

„ 26, line 15. *After* "per cubic foot." *add* "Molesworth in 'Graphic Diagrams for Strength of Teak Beams' gives: Weight, 37 lbs., P = 640, E = 3,500."

„ 27, *Mesua ferrea.* To vernacular names *add* "*Nahsher,* Mechi; *Kesara,* Kan.;"

„ 27, line 9. *After* "evergreen tree." *add* "Bark ¼ inch thick, reddish brown, peeling off in flat thin flakes, leaving a slightly roughened surface."

„ 27, line 26. *After* "cubic foot in weight." *add* "Molesworth in 'Graphic Diagrams for Strength of Teak Beams' gives: Weight, 71 lbs., P = 1,040, E = 6,000."

„ 27, at the end of MESUA, *add* "C 3513 and C 3524 (55 lbs.), from Kohori, Khurdha, Orissa, where the tree was planted on an area of about 12 acres by a former Raja of Khurdha, are *Ochrocarpus longifolius,* Bth. and Hook. f. Vern. *Chhuriana,* Uriya. Bark reddish brown, ¼ inch thick, exuding a red gum. Wood red, hard, close- and even-grained. Pores moderate-sized. Medullary rays moderately broad, very numerous, the distance between them equal to, or less than, the diameter of the pores. Annual rings marked by a darker line. Lines of soft texture numerous, but indistinct. Numerous resin-ducts in radial long cells, which appear as shining lines on a horizontal, and black points on a vertical transverse section. Growth moderate, 8 rings per inch of radius. Weight, 55 lbs. per cubic foot."

„ 28, line 25. *For* "Bhutan Himalaya." *read* "Sikkim and Bhutan Himalaya."

„ 28, line 10 from the bottom. *Add* "Growth moderate, 7 rings per inch of radius."

„ 29, line 15. *After* "*Ouli gogen,* Nep.;" *add* "*Laidonto,* Mechi;"

„ 29, at the end of 1. **S. napaulensis,** *add*—

"2. **S. Roxburghii,** Wall.; Hook. Fl. Ind. i. 287; Kurz i. 103; Gamble 8. *Ternströmia serrata,* Roxb. Fl. Ind. ii. 521. Vern. *Dalúp,* Sylhet; *Ouli gogen,* Nep.; *Dangsipha,* Lepcha; *Laidonto,* Mechi.

"A small tree Bark thin, reddish brown Wood reddish brown, soft, with large central pith Pores small, very numerous Medullary rays fine, very numerous and closely set

"Eastern Sub Himalayan tract, Khasia Hills, Eastern Bengal and Burma.

"E 3271 Borojhar Reserve, Western Duars 42 lbs '

Page 29, *Schima Wallichii* To vernacular names *add* "*Singbrang*, Lepcha, *Gugera*, Garo, *Gogra*, *phulgogra*, Mechi, *Sangraban*, Magh, *Sambaw*, Arracan,

" 30, *S Wallichii* To numbers *add*—

"E 3602. Sivoke Forests, Darjeeling Terai . . 41 lbs"

" 30, line 9 *After* "demand" *add* "Hooker in Himalayan Journals i 157, says that it is much prized for ploughshares and other purposes needing a hard wood"

" 30, lines 16 and 17 from the bottom. *For* "Bark thin ' *read* "Bark very thin ' *and for* "Wood grey, soft, even grained *read* "Wood pink, moderately hard, close and even grained. '

" 30, *Camellia drupifera* To list of numbers *add*—

"E 3358 Sivoke Hills, Darjeeling, 1,500 ft 60 lbs. '

" 30, last line *For* "3142' *read* "3143'

" 32, line 28. *After* "*Guga*, ' *add* "*walivara*,

" 32, last line but one *After* "No 63,' *add* "(marked *D alatus*, which however is not the 'Eng' tree, as this is) '

" 34, line 13 *For* "Medullary rays fine, broad *read* "Medullary rays fine to broad

" 34, *Shorea robusta* To vernacular names *add* "*Sarjum* Kol, *Sargi*, Bhumij, *Sakwa*, Kharwar, *Sekwa*, Oraon, *Shal*, Beng, '

" 36, above line 12 from the bottom, *insert* "Recent countings made in the forests of Chota Nagpore shew that the rate of growth in Saranda may be taken at 7 to 9 rings per inch for trees growing in good soil in sheltered localities, and 12 to 15 rings for trees in more exposed conditions (*Indian Forester*, Vol VI, p 318) Small trees counted in Orissa gave the very good rate of 3 rings per inch Countings of rings on rounds in the Bengal Forest Museum, cut in the Dulka Jhar Reserve, shew as follows —

No	Rings	Radius
E 3626	47	8 5 inches
E 3627	42	8 0 "
E 3628	53	8 5 "
E 3629	70	9 0 "
E 3630	57	8 0 "

or an average of 6 2 rings per inch of radius No E 3617 from Sivoke and E 3616 from Bamunpokri, both rounds, give the first 7, the second 5 7 rings per inch, so that the Sikkim Terai sal seems to have a similar rate of growth to that of Oudh

" 36, last line but one *After* "being 790 *add* "Molesworth in 'Graphic Diagrams for Strength of Teak Beams' gives Weight, 60 lbs, P = 926, E = 4 800 '

" 37, in schedule of experiments *After* "Cunningham" last line but two, *add*—

"Dundas	1877	Oudh . .	12	10′×4 ×6	59	651 E=2 500
"		"	12	2 ×1 ×1″	"	864
Thornhill	1846	Terai of N W P and Oudh	39	Various	"	710 '

" 38, line 13 *After* "now available," *add* "(A tree, measured in the Valley of the Great Rangit, Darjeeling gave girth at 4 ft. from the ground 128 inches, height 161 feet, height to first branch, 86 feet)

Page 38, in list of numbers. *For* "O 388" *read* "O 386, 387, 388, 390."

,, 38. *After* C1235 *add*—

"C 3434. Kumandi Reserve, Palamow.
"C 3440. Neturhát, Palamow.
"C 3441. Chaupi ,,
"C 3444. Henar ,,
"C 3472. } Rongo, Saranda, Singbhúm.
"C 3473. }
"C 3478. } Ankua Hill, Saranda { 2,700 feet.
"C 3479. } { 2,000 ,,
"C 3480. } { 1,800 ,,
"C 3490. Kolhán Forests, Singbhúm.
"C 3556. Khurdha Forests, Orissa . . . 48 lbs.
"C 3546. ,, ,,
"E 3385. Berhampore Forest, Rungpore, Bengal 80 lbs.

and *after* "E 2322" *add*—

"E 3616, 3618. Bamunpokri, Darjeeling, 1,000 ft.
"E 3624 to E 3630. Dulka Jhar, Darjeeling Terai 57 lbs. (E3625)
"E 3589. Sivoke Forests, Darjeeling Terai . . 47 lbs.
"E 3617. ,, ,, ,, ,,
"E 3390. Dhupguri, W. Duars."

,, 39, at the end of 6. S. siamensis, *add*—

"7. **S. assamica**, Dyer; Hook. Fl. Ind. i. 307. Vern. *Makai*, Ass.

"A large tree. Wood brown, moderately hard. Pores large, sometimes surrounded by a ring of lighter tissue. Medullary rays fine to moderately broad, short, the distance between them equal to the diameter of the pores.

"Upper Assam.

"The wood, according to Mr. Mann, is used for planking and for making canoes.

"E 3369. Makum, Assam."

,, 40, line 27. *For* "Bennett in 1872, No. 5, Andaman Wood, gave 58 lbs., P = 737" *read* "Bennett in 1872, No. 5, three experiments with Andaman wood 3′ × 1½″ × 1½″ gave 58 lbs., P = 711."

,, 42, ,, 17 from the bottom. *After* "Beng.;" *add* "*Múoh*, Gáro;"

,, 42, ,, 10 from the bottom. *After* "*Juwa, oru*, Beng.;" *add* "*Daswála*, Kan.;"

,, 43, ,, 2. *Add* "Sebert in 'Les Bois de la Nouvelle Calédonie' says it is used at Tahiti for planking and building light boats."

,, 43. After line 4 *add* "E 3289, from the Rinkheong Reserve, Chittagong, is the wood of *H. macrophyllus*, Roxb. A small tree. Bark ¼ in. thick, light brown, fibrous, rather smooth. Sapwood white, heartwood light, purplish brown, soft, even-grained. Pores large, somewhat scanty, often subdivided. Medullary rays fine but clearly marked, unequally distributed, short. Annual rings marked by fewer pores in the autumn wood. Growth fast, 3 rings per inch of radius."

,, 43, line 8. *After* "(Wallich);" *add* "*Reké*, Kól;"

,, 43, *Thespesia populnea*. To vernacular names *add* "*Asha, hurvashi*, Kan.; *Bugari*, Hassan;"

,, 43, line 23. *Add* "Sebert in 'Les Bois de la Nouvelle Calédonie' gives the weight at 42 lbs. per cubic ft."

,, 43, *Kydia calycina*. To vernacular names *add* "*Moshungon*, Mechi; *Bitha gonyer*, Kól; *Derhi*, Kharwar; *Kunji*, Gondi; *Bende-náru*, Kan.;"

,, 44, *Bombax malabaricum*. To vernacular names *add*—

"*Panchu*, Gáro; *Dél*, Kól; *Búrga*, Kan.;"

Page 44, *B malabaricum* To numbers *add*—
"E 3606 Sivoke Forests, Darjeeling Terai "

„ 44, line 16 from bottom. *After* "cuttings" *add* "C 978 is a fine specimen of the fibre sent from Berar and capable of being used for rough paper"

„ 45, last line but one. *After* "*Dodeli*, Kan," *add* "*Bara laiphanzeh*, Mechi,"

„ 46, *Sterculia urens* To vernacular names *add* "*Keonge*, Manbhúm, *Teley*, Kól, *Mogul, karaunji*, Monghyr," and to numbers *add*—
"C 3436 Kumandi Reserve, Palamow, Chota Nagpore "

„ 46, *S villosa* To vernacular names *add* "*Sisi, walkóm*, Kól, *Pironja*, Mundari, *Sisir*, Oraon,"

„ 47, *S colorata* To vernacular names *add* "*Sisi*, Kól, *Lersima*, Kharwar,"

„ 49, *Helicteres Isora* To vernacular names *add* "*Ainthia dhamin*, Monghyr, *Renta, sakomsing*, Kól, *Aiteni*, Kharwar, *Muri muri*, Uriya,"

„ 49, *Pterospermum acerifolium* To vernacular names *add* "*Laider*, Mechi," and *change* "*Mús*, Beng" *to* "*Mus*, Beng"

„ 49, *P acerifolium* To numbers *add*—
"E 3596 Sivoke Forests, Darjeeling Terai . 46 lbs"

„ 50 *P. suberifolium* To vernacular names *add* "*Giringa* Uriya, and to numbers *add* "C 3523, C 3534 Khurdha Forests, Orissa

„ 50 *Eriolæna Hookeriana* To vernacular names *add* "*Bundun, oit bulung*, Kol, *Ponra*, Oraon,"

„ 51, line 8 *For* "C 3791" *read* "C 3191, and *after* it *add* "C 3437 Kumandi Reserve, Palamow, Chota Nagpore

„ 52, „ 7 *After* "*Chowra*," *add* '*kadu-bende*,'

„ 52, „ 31. *After* "markets" *add* 'It is also cut up into thin planking and exported to Assam to make tea boxes

„ 52, *Pentace burmanica* To numbers add "B 2915. Burma

„ 53 In strength schedule, column 'Year,' last line but one, *after* "A. Mendis, No 33 *add* "1855'

„ 53, first line after schedule *After* "probably this *add* "Molesworth gives Weight 50 lbs, P = 844 E = 3,000

„ 53, *Berrya Ammonilla* *To list of numbers add*—
"No 33 Ceylon collection . . 48 lbs

„ 54, first line *After* "Tel," *add* "*Bolmengo*, Gáro, *Kokúrsida*, Mechi,"

„ 54, *Grewia tiliæfolia* To vernacular names *add* "*Tarada*, Madura,

„ 55, *G salvifolia* To vernacular names *add* "*Bursu, sita pelu* Kól" and to numbers *add* "C 3457. Barasand Reserve, Palamow, Chota Nagpore"

„ 55, *G vestita* To vernacular names *add* "*Pershuajelah*, Mechi,"

„ 56, *G. pilosa* To vernacular names *add* '*Bhorkund*, Monghyr,' *Gursikri*, Kharwar,

„ 56, at the end of *G* [illegible] a small tree fror [illegible] resembles the wooc [illegible] ur of the latter [illegible].

„ 56, „ 18 *After* "*Banj*, Nep," *add* "*Saimuladdi*, Mechi,"

„ 57, „ 16 *After* "*Rudrak*, Hind," *add* "*Dandla*, Mysore,"

„ 58, *Erythroxylon monogynum* To vernacular names *add* "*Devaddrum*, Kan,"

„ 58, line 22 *After* "boats." *add* "Dr Bidie says that 'During the Madras famine the leaves were largely eaten by the starving poor, and as there is nothing in them structurally likely to satisfy the pangs of hunger, it seems probable that they contain some principle like that of *E. Coca*'"

Page 58, line 21 from the bottom. *After* " Beng.;" *add* " *Boromali,* Uriya;"
" 58, " 9 from the bottom. *After* " Beng.;" *add* " *Kiranelli,* Kan.;"
" 59, " 5. For " *Bönninghau senia* " *read* " *Bönninghausenia* "
" 59, " 7. *For* " *Xanthoxyleæ* " *read* " *Zanthoxyleæ*" and *for* " *Xanthoxylum*" *read* " *Zanthoxylum* "
" 59, " 19. *After* " *Loajam,*" *add* " *holholi* "
" 59, " 20. *After* " Burma." *add* " Kyd gives: Weight 36 lbs., P= 267."
" 59, " 22. *After* "Hind.;" *add* "*Chouldua,* Uriya; *Laker-konta,* Monghyr;"
" 59, " 38. *After* " *Kawat,* Mar.;" *add* " *Naibela,* Kan.;"
" 59, " 46. *After* " *Suntala,* Nep.;" *add* " *Shoungpang,* Magh;"
" 60, " 28. *For* " pael" *read* " pale"

Pages 60, 61. For the whole of 2. XANTHOXYLUM, Linn. *substitute* the following :—

"2. ZANTHOXYLUM, Linn.

"Contains 10 small, rarely large trees or climbing shrubs, usually armed with strong prickles. Besides the species here described *Z. tomentellum,* Hook. Fl. Ind. i. 493, is a small tree of the Eastern Himalaya. *Z. Khasianum,* Hook. f., of the Khasia Hills and *Z. tetraspermum,* W. & A. of the Western Ghâts, are prickly climbing shrubs. *Z. Rhetsa,* DC.; Hook. Fl. Ind. i. 495; Beddome xli (*Fagara Rhetsa,* Roxb. Fl. Ind. i. 417) Vern. *Rhétsa, mán,* Tel.; *Tessal,* Mar.; *Rattu kina,* Cingh., is a large tree of Southern India. *Z. Andamanicum,* Kurz. i. 181, is a straggling shrub of the Andaman Islands.

"1. **Z. alatum,** Roxb. Fl. Ind. iii. 768; Hook. Fl. Ind. i. 493; Beddome xlii.; Brandis 47; Gamble 14. Vern. *Timbúr, timur, tezmal, dúrmúr,* Hind.; *Balay timur,* Nep.; *Gaira,* Monghyr; *Sungrú,* Lepcha.

"A shrub or small tree. Bark corky, young stems with thick conical prickles from a corky base. Wood close-grained, yellow, Pores small, often in radial lines, not uniformly distributed; belts with numerous pores often alternating with belts with scanty pores. Medullary rays fine, short, very numerous.

" Outer Himalaya from the Indus to Bhutan, ascending to 7,000 ft.; Khasia Hills.

" The wood is used for walking-sticks, the branches for making tooth-brushes. The fruit is a remedy for toothache and is also used to purify water and as a condiment. The whole plant has a strong unpleasant aromatic smell.

"H 107.	Bhajji, Simla, 4,000 ft. . . .	46 lbs.
"E 2329.	Tukdah, Darjeeling, 5,000 ft. .	34 „

"2. **Z. acanthopodium,** DC.; Hook. Fl. Ind. i. 493; Kurz i. 181; Gamble 14. Vern. *Bogay timur,* Nep.

"A small tree. Bark $\frac{1}{8}$ inch thick, greyish brown, shining, studded with the large conical corky bases of the prickles which fall off as the tree grows. Wood yellowish white, soft. Pores small, often in short radial lines. Medullary rays fine, numerous.

" Outer Himalaya from Kumaun to Sikkim, and the Khasia Hills, up to 7,000 ft.

" A common small tree in second growth forest. Growth fast, our specimen (a round) shews 11 rings on a mean radius of $2\frac{1}{2}$ inches, or 4·4 rings per inch of radius.

" E 3415. The Park, Darjeeling, 6,500 ft.

"3. **Z. oxyphyllum,** Edgew.; Hook. Fl. Ind. i. 494; Gamble 14. Vern. *Timur,* Nep.

"A climbing shrub. Bark greyish brown, covered with large corky lenticels, and armed with recurved thorns on a conical corky base, often ¾ inch high Wood yellowish white, soft, porous Pores large, usually many times subdivided radially. Medullary rays moderately broad, bent where they pass the pores Annual rings marked by a white line

"Himalaya from Garhwal to Bhutan, from 6 000 to 8,000 ft , Khasia Hills, 4 000 to 6,000 ft

"E 3375 Darjeeling, 6,500 ft

"4 **Z. Hamiltonianum**, Wall , *Hook. Fl. Ind* i *494*, *Kurz* i 181 , Gamble 14 Vern *Purpyray timur*, Nep

"A climbing thorny shrub Bark dark grey with white lenticels, armed with short recurved prickles on a thick, nearly cylindrical corky base, often ¾ inch high Wood yellowish white, soft Pores fine, not numerous Medullary rays fine to moderately broad, numerous, nearly equidistant

"Sikkim and Assam

"E 3416. The Park, Darjeeling 6,500 ft.

"5 **Z. Budrunga, DC** , Hook. Fl. Ind i 495, Kurz i 182, Vern *Brojonali*, Ass , *Mayaning*, Burm

"A tree with greyish brown bark, young stems covered with thick conical prickles from a corky base Wood moderately hard, close grained, white Pores small, uniformly distributed, often in short radial lines Medullary rays fine, short, numerous

"Eastern Himalaya, Khasia Hills, Eastern Bengal and Burma.

"E 3324 Pankabari, Darjeeling 2,000 ft.

"6. **Z ovalifolium**, Wight , Hook Fl. Ind i 492 , Beddome xlii , Gamble 13

"A shrub Bark thin, grey brown, with white vertical streaks. Wood light yellowish white, very hard, close grained Pores very small, rather scanty, evenly distributed Medullary rays fine, very numerous Numerous sharp, white, concentric lines, as in *Murraya exotica*, which it much resembles in structure.

"Eastern Himalaya, Khasia Hills, Assam and the Western Ghâts

"E 3353 Sivoke Hills, Darjeeling, 1,500 ft . 54 lbs."

Page 61, Heading *For* "*Xanthoxylum*" *read* "*Zanthoxylum*,"

" 61, *Toddalia aculeata* To vernacular names *add* "*Tundupara*, Uriya,"

" 61, *Skimmia Laureola.* To numbers *add* "E 3293 Mahalderam, Darjeeling, 7,000 ft"

" 61, line 14 from the bottom *For* "6" read "5"

" 61, lines 13 to 7 from the bottom *Strike out* and *add* at the end of *M exotica* on page 62 the following

"2. **M Konigii**, Spr. , Hook Fl. Ind [illegible] , Brandis 48 , Kurz i 190 , [illegible] Roxb Fl. Ind ii 375 Vern [illegible] *katnim*, Hind , *Barsanga*, [illegible] Banda, *Humwah*, Mechi , *Karsepak*, *kari-vepa*, Tel , *Kamwepila*, Tam , *Kari bévu*, Kan

"A small tree Bark grey with shallow netted fissures Wood greyish white, hard Pores small, sometimes subdivided or arranged in short radial lines Medullary rays fine, very numerous Concentric white lines less strongly marked than in *M exotica*

"*Outer Himalaya from the Ravi to Assam, Bengal, South India* and Burma The wood is durable and is used for agricultural implements, The leaves are used to flavour curries.

"O 3265 Saharanpur . . . . 43 lbs"

Page 62, *Murraya exotica.* To numbers *add* "C 3495. Kolhán Forests, Singbhúm, Chota Nagpore."

„ 62, line 12. *For* "5" *read* "6"

„ 62, *Atalantia monophylla.* To vernacular names *add* "*Narguni*, Uriya;" *and* to numbers *add* "C 3515. Khurdha Forests, Orissa."

„ 62, *Feronia Elephantum.* To vernacular names *add* "*Vellam*, Madura;"

„ 63. *Ægle Marmelos.* To vernacular names *add* "*Maika*, Gondi; *Lohagasi*, Kól; *Aurelpang*, Magh;"

„ 63. At the end of 8. Aegle. *After* "soft tissue." *add*—

"E 3295 is *Paramignya monophylla*, Wight, from Babookhola, Darjeeling, 4,000 ft.* Bark white, corky, vertically cleft. Wood white, hard, close-grained. Pores very small to moderate-sized. Medullary rays very fine, extremely numerous. Prominent, sharp, white, concentric lines at unequal distances and often joining each other.

"E 3371 is the Orange, *Citrus Aurantium*, Linn. from Rajabhatkhawa, W. Dúars. Bark thin, greenish grey. Wood yellowish white, moderately hard, close and even-grained. Pores small, scanty, joined by concentric patches of white colour, which occasionally join, forming concentric circles. Medullary rays fine, very numerous, equidistant.

"E 3348 is the Lime, *Citrus medica*, L., from Darjeeling. Bark yellowish white, thin. Wood white, moderately hard. Pores small, numerous, often subdivided or in short radial lines. Medullary rays fine, very numerous. Concentric white lines distant. Pores often joined by white concentric patches.

"E 3284 is *Glycosmis pentaphylla*, Correa, from Chittagong. Bark light greyish-yellow. Wood white, hard, close-grained. Pores small, sometimes subdivided or arranged in radial lines. Medullary rays fine, wavy, very numerous. Sharp concentric white lines, often running into each other, very prominent.

"E 3355 is *Micromelum pubescens*, Bl., from the Teesta Valley, Darjeeling. Bark thin, white. Wood yellowish white, hard, close-grained. Pores small, scanty, often subdivided. Medullary rays fine, sharply marked. Sharp white concentric lines, often running into each other, prominent.

"E 3354 is *Clausena excavata*, Burm., from Sivoke, Darjeeling Terai. Bark thin, smooth, dark brown. Wood white. Pores small, scanty. Medullary rays very fine, very numerous. White concentric lines often interrupted, but very closely packed radially.

"C 3530 and C 3570 are *Limonia acidissima*, Linn. Vern. *Bhenta*, Uriya, from the Khurdha Forests, Orissa. It has a thin, light-brown bark, and very hard, yellowish-white wood. The pores are small, surrounded by white tissue, solitary or arranged in oblique strings. Medullary rays very fine, numerous, uniform and equidistant. Annual rings marked by a white line. Growth moderate, 8 rings per inch of radius. Weight, 59 lbs. per cubic foot."

„ 64, *Ailanthus malabarica.* To vernacular names *add* "*Mandadúpa*, Hassan;"

„ 64, *A. excelsa.* To vernacular names *add* "*Mahanim*, Uriya; *Ghorkaram*, Palamow;" and to numbers *add* "C 3449. Betlah Reserve, Palamow, Chota Nagpore."

„ 64, line 24. *After* "tree." *add* "Bark light greyish-brown, fibrous, rough."

„ 65, line 12 from the bottom. *For* "*Komari*" *read* "*Koniari*," and at line 5 from the bottom *add*—

"C 3541. Khurdha Forests, Orissa . . 46 lbs."

„ 67, line 3. *For* '*Enkar*' *read* '*Kankar*'

„ 67, *Garuga pinnata.* To vernacular names *add* "*Nia jowa*, Kól; *Kékur*, Kharwar; *Karúr*, Bhumij; *Gharri*, Gondi;"

Page 67, *G pinnata* To numbers *add*—

"E 3601 Sukna Forest, Darjeeling Terai '

„ 68, line 3 *After* "Burma" *add* "found by Mr R Thompson in Bastar and on the hills of Panabarás '

„ 68, *Canarium bengalense.* To numbers *add*—

"E 3592. Sukna Forest, Darjeeling"

„ 70 *After* line 12 *add* "Molesworth gives in ' Graphic Diagrams for the Strength of Teak Beams' Weight 50 lbs, P = 736, E = 2,900."

„ 71. *After* line 19, to numbers *add*—

"E 3357 Kalimpung, Darjeeling, 4,000 ft
"E 3360 Rangirúm, Darjeeling, 5,000 ft"

„ 71, at the end of MELIA *add* "E 3499 is *Cipadessa fruticosa*, Bl, from the Khurdha Forests, Orissa, where it is a common shrub or small tree of the dry stony hills and laterite plateaux, and used for fuel It has a thin reddish brown bark and a red, moderately hard wood, which has a faint odour resembling that of the Toon wood. Pores very fine, numerous, usually in lines between the very numerous close and fine medullary rays These latter are slightly wavy and short, and bend where they meet the pores The pores are prominent as red lines on a vertical section Annual rings marked by a white line. Growth of our specimen 5 to 6 rings per inch of radius. Weight, about 50 lbs per cubic foot"

„ 72, *Dysoxylum procerum.* To numbers *add*—

"E 3595 Rungdung Forest, Darjeeling Terai '

„ 72, line 4 *Before* "Assam ' *add* "Sikkim and the Western Dúars,'

„ 73, *Amoora Rohituka.* To vernacular names *add* "*Sikru*, Kól,'

„ 73, at the end of "**3 A. spectabilis**" *add*—

"**4 A decandra**, Hiern, Hook Fl Ind i 562, Gamble 16 Vern *Tangaruk*, Lepcha

pinkish white, hard. Pores concentric, bands of soft

"Eastern Himalaya, from 2,000 to 6 000 ft
"E 3392 Lebong, Darjeeling, 5,500 ft"

„ 74, at the end of "WALSURA'

is *Heynea trijuga*,

and yellowish whi[illegible]

subdivided, in groups or in short radial strings, surrounded with white tissue and arranged in wavy concentric lines Medullary rays fine, short, numerous"

„ 74, *Carapa moluccensis* To vernacular names *add* "*Pussur*, Beng ,"

„ 74, line 22 *After* ' the hair" *add* "Capt Baker in May 1829 in 'Gleanings in Science' spoke of *Fussur* or *Pussooah* as being a jungle wood of a deep purple colour, extremely brittle and liable to warp He said that native boats made of the best species last about 3 years, and that the wood, if of good quality, stands brackish water better than sál.

"The following were Captain Baker's experiments —

				Weight	P=
49, 52	Large tree	1825	$6 \times 1\frac{1}{2}'' \times 2'$	51 5	472
47, 48	Small „	1826	„	44	484
95, 101	Large „	1826	„	46	562
104	Small „	1826	„	47	586
334, 335	Large „	„	$33' \times 1\frac{1}{2} \times 1''$	..	502"

„ 75, line 31. *After* "wood 546" *add* "Molesworth gives for Honduras wood Weight 35 lbs, P = 615, E = 3,100."

Page 62, *Murraya exotica.* To numbers *add* "C 3495. Kolhán Forests, Singbhúm, Chota Nagpore."

„ 62, line 12. *For* "5" *read* "6"

„ 62, *Atalantia monophylla.* To vernacular names *add* "*Narguni*, Uriya;" *and* to numbers *add* "C 3515. Khurdha Forests, Orissa."

„ 62, *Feronia Elephantum.* To vernacular names *add* "*Vellam*, Madura;"

„ 63, *Ægle Marmelos.* To vernacular names *add* "*Maika*, Gondi; *Lohagasi*, Kól; *Auretpang*, Magh;"

„ 63. At the end of 8. Aegle. *After* "soft tissue." *add*—

"E 3295 is *Paramignya monophylla*, Wight, from Babookhola, Darjeeling, 4,000 ft. Bark white, corky, vertically cleft. Wood white, hard, close-grained. Pores very small to moderate-sized. Medullary rays very fine, extremely numerous. Prominent, sharp, white, concentric lines at unequal distances and often joining each other.

"E 3371 is the Orange, *Citrus Aurantium*, Linn. from Rajabhatkhawa, W. Dúars. Bark thin, greenish grey. Wood yellowish white, moderately hard, close and even-grained. Pores small, scanty, joined by concentric patches of white colour, which occasionally join, forming concentric circles. Medullary rays fine, very numerous, equidistant.

"E 3348 is the Lime, *Citrus medica*, L., from Darjeeling. Bark yellowish white, thin. Wood white, moderately hard. Pores small, numerous, often subdivided or in short radial lines. Medullary rays fine, very numerous. Concentric white lines distant. Pores often joined by white concentric patches.

"E 3284 is *Glycosmis pentaphylla*, Correa, from Chittagong. Bark light greyish-yellow. Wood white, hard, close-grained. Pores small, sometimes subdivided or arranged in radial lines. Medullary rays fine, wavy, very numerous. Sharp concentric white lines, often running into each other, very prominent.

"E 3355 is *Micromelum pubescens*, Bl., from the Teesta Valley, Darjeeling. Bark thin, white. Wood yellowish white, hard, close-grained. Pores small, scanty, often subdivided. Medullary rays fine, sharply marked. Sharp white concentric lines, often running into each other, prominent.

"E 3354 is *Clausena excavata*, Burm., from Sivoke, Darjeeling Terai. Bark thin, smooth, dark brown. Wood white. Pores small, scanty. Medullary rays very fine, very numerous. White concentric lines often interrupted, but very closely packed radially.

"C 3530 and C 3570 are *Limonia acidissima*, Linn. Vern. *Bhenta*, Uriya, from the Khurdha Forests, Orissa. It has a thin, light-brown bark, and very hard, yellowish-white wood. The pores are small, surrounded by white tissue, solitary or arranged in oblique strings. Medullary rays very fine, numerous, uniform and equidistant. Annual rings marked by a white line. Growth moderate, 8 rings per inch of radius. Weight, 59 lbs. per cubic foot."

„ 64, *Ailanthus malabarica.* To vernacular names *add* "*Mandadúpa*, Hassan;"

„ 64, *A. excelsa.* To vernacular names *add* "*Mahanim*, Uriya; *Ghorkaram*, Palamow;" and to numbers *add* "C 3449. Betlah Reserve, Palamow, Chota Nagpore."

„ 64, line 24. *After* "tree." *add* "Bark light greyish-brown, fibrous, rough."

„ 65, line 12 from the bottom. *For* "*Komari*" *read* "*Koniari*," and at line 5 from the bottom *add*—

"C 3541. Khurdha Forests, Orissa . . 46 lbs."

„ 67, line 3. *For* '*Knkar*' *read* '*Kankar*'

„ 67, *Garuga pinnata.* To vernacular names *add* "*Nia jowa*, Kól; *Kékur*, Kharwar; *Karúr*, Bhumij; *Gharri*, Gondi;"

Page 67, *G pinnata* To numbers *add*—
"E 3601 Sukna Forest, Darjeeling Terai"

" 68, line 3 *After* "Burma' *add* "found by Mr R Thompson in Bustar and on the hills of Panabaras

, 68, *Canarium bengalense*. To numbers *add*—
"E 3592 Sukna Forest, Darjeeling"

, 70 *After* line 12 *add* "Molesworth gives in 'Graphic Diagrams for the Strength of Teak Beams' Weight 50 lbs, P = 736, E = 2,900'

, 71. *After* line 19, to numbers *add*—
"E 3357 Kalimpung Darjeeling, 4 000 ft
'E 3360 Rangirum, Darjeeling, 5,000 ft'

71, at the end of MELIA *add* "E 3499 is *Cipadessa fruticosa*, Bl, from the Khurdha Forests, Orissa, where it is a common shrub or small tree of the dry stony hills and laterite plateaux and used for fuel It has a thin reddish brown bark and a red, moderately hard wood, which has a faint odour resembling that of the Toon wood. Pores very fine, numerous, usually in lines between the very numerous close and fine medullary rays These latter are slightly wavy and short, and bend where they meet the pore [illegible] lines on a vertical section An [illegible] Growth of our specimen 5 to [illegible] about 50 lbs per cubic foot'

" 72 *Dysoxylum procerum* To numbers *add*—
"E 3595 Rungdung Forest, Darjeeling Terai'

, 72, line 4 *Before* "Assam *add* 'Sikkim and the Western Dúars,'

, 73 *Amoora Rohituka* To vernacular names *add* "*Sikru*, Kól,

, 73, at the end of "3 **A spectabilis** *add*—
"4 **A decandra** Hiern, Hook Fl Ind i 562, Gamble 16 Vern *Tangaruk*, Lepcha
[illegible] te, hard Pores [illegible] bands of soft
"Eastern Himalaya, from 2 000 to 6 000 ft
"E 3392 Lebong, Darjeeling, 5 500 ft

, 74, at the end of "WALSURA' *add* '[illegible] is *Heynea trijuga*, Roxb [illegible] and yellowish white, mod[illegible] subdivided, in groups or in short radial strings, surrounded with white tissue and arranged in wavy concentric lines Medullary rays fine, short, numerous

" 74 *Carapa moluccensis* To vernacular names *add* "*Pussur*, Beng,"

" 74 line 22 *After* 'the hair *add* "Capt Baker in May 1829 in 'Gleanings in Science spoke of *Pussur* or *Pussooah* as being a jungle wood of a deep purple colour, extremely brittle and liable to warp He said that native boats made of the best species last about 3 years, and that the wood, if of good quality, stands brackish water better than sal
'The following were Captain Baker's experiments —

				Weight	P=
49, 52	Large tree	1825	6 × 1½″ × 2″	51 5	472
47 48	Small "	1826	"	44	484
95, 101	Large "	1826	"	46	562
104	Small "	1826	"	47	586
334 335	Large "		33′ × 1½ × 1″		502

" 75, line 31 *After* "wood 546 *add* "Molesworth gives for Honduras wood Weight 35 lbs, P = 615, E = 3,100

Page 76, *Soymida febrifuga.* To vernacular names *add* "*Suam,* Uriya;"

„ 76. To numbers *add*—

"C 3566. Khurdha Forests, Orissa . . . 71 lbs."

„ 77, *Chloroxylon Swietenia.* To vernacular names *add* "*Sengel sali,* Kól; *Bharhúl,* Kharwar; *Bhira,* Gondi; *Bhirwa,* Baigas;"

„ 77. Below line 31 *add* "Molesworth in 'Graphic Diagrams for the Strength of Teak Beams' gives: Weight 60 lbs., P = 950, E = 5,200."

„ 77, *C. Swietenia.* To numbers *add*— lbs.

"C 3443.	Seemah Reserve, Palamow	...
C 3572.	Khurdha Forests, Orissa . . .	57
D 2926.	Madras	..."

„ 78, *Cedrela Toona.* To vernacular names *add* "*Kujya,* Tippera; *Somso,* Bhutia; *Katangai,* Kól; *Madagiri vembu,* Madura;"

„ 79, *C. Toona.* To numbers *add*— lbs.

"C 3476.	Saranda Forests, Chota Nagpore . .	...
"C 3545.	Khurdha Forests, Orissa . . .	31
"E 3599.	Sukna Forests, Darjeeling . . .	39
"E 3619,	Latpanchor, Darjeeling Hills, 4,000 ft. .	...
"E 3623,	Kalingpung, Darjeeling, 2,000 ft. .	35

(The last shews 11 rings on 7 inches radius or 1·6 rings per inch, while No. E 3619 has 31 rings on a radius of 7½, or about 4 per inch, and E 3599 shews 3½ rings per inch.)"

„ 79. After the end of **C. serrata,** above the 6th line from the bottom of the page, *add*—

"In the Monograph of the Meliaceæ published in 1878 by Casimir de Candolle, the species of *Cedrela* formerly grouped under the one head of *Cedrela Toona,* Roxb., have been separately described. They are thus distinguished:—

"Ovary glabrous—

"Leaflets petioled . . . *C. serrata,* Royle.
"Leaflets subsessile . . . *C. glabra,* C. de Cand.

"Ovary hairy—

"Leaflets acute at the base . *C. Toona,* Roxb.
"Leaflets round at the base . *C. microcarpa,* C. de Cand.

"In the 'Trees, Shrubs and Climbers of the Darjeeling District," three varieties were spoken of and separated as follows:—

"'No. 1. Deciduous; flowering March; fruiting June; bark grey-brown, smooth, exfoliating; found in the plains on low land.

"'No. 2. Evergreen; flowering October–November; fruiting February and March; bark dark brown, rough, not exfoliating; found in the lower hills up to 4,000 ft.

"'No. 3, Evergreen; flowering June; fruiting November–December; bark light reddish-brown, exfoliating in long flakes; found in the upper hills from 5,000 to 7,000 ft. and of great size.'

"No. 1 is *C. Toona,* Roxb.; No. 2 probably *C. microcarpa,* C. de Cand.; No. 3, probably *C. glabra,* C. de Cand. It would, however, have probably been better to describe No. 1 as 'deciduous in the cold season' and Nos. 2 and 3 as 'deciduous in the rains.' There is perhaps a fifth species.

"They may also be distinguished as follows by the capsule:—

Capsule smooth . { capsule round . *C. Toona.*
„ long, pointed . *C. microcarpa.* }
Capsule covered with corky tubercles . *C. glabra.*

"Of the Northern Bengal specimens which we have examined, E 360 and E 2333 will be *C. glabra,* while E 655, E 2332, E 3599,

E 3619, and E 3623 will be *C microcarpa* Some of the Assam, Chittagong and Burma specimens are probably *C microcarpa.*

"No B 3378 from the Salween, 2,000 feet, is probably *C. multijuga*, Kurz i 229 Vern *Toungdama* Burm, *Nee*, Karen (Trade name, like the other Toon-woods, *Thitkado*) It has a light, soft, pink wood, with the usual characteristic scent strongly perceptible, and structure resembling that of the other species of Toon, the pores being perhaps more scantily distributed Weight, 35 5 lbs. per cubic foot"

At the foot of the page *add*—

"E 3341, from the north eastern part of Sibságar, Assam, called *Mipal*, is a soft, reddish wood, resembling that of *Melia* It is evidently a useful wood for the same purposes as Toon is used, it splits well and is used for shingles Pores moderate sized to large, often subdivided. Medullary rays moderately broad, short, tapering gradually at the ends Annual rings distinct, about 7 per inch of radius Weight, 27 lbs. per cubic foot'

Page 80, line 19 Omit "*Daphniphyllopsis.*'

" 81, *Olax scandens* To vernacular names *add* "*Arthil*, Monghyr, *Rimmel*, Kol, *Bodobodoria*, Uriya,' To numbers *add* "C 3467 Bandgaon, Singbhum, Chota Nagpore *and* C 3494. Kolhán Forests, Singbhúm, Chota Nagpore.

" 81, 2 **Daphniphyllopsis,** Kurz, &c, should be transferred to p 213 under **CORNACEÆ** *Nyssa sessiliflora*, Hook f, Hook Fl Ind ii 747.

" 81, *Daphniphyllopsis capitata* To numbers *add*—

"E 3608 Darjeeling, 6,000 ft"

" 83, line 8. [illegible] "Growth a small tree (E 3407) [illegible] 14 rings with a girth of [illegible]"

" 85 *After* "5 **E theæfolius**" *insert*—

"6 **E frigidus,** Wall, Hook Fl Ind i 611, Gamble 18

A straggling shrub Wood yellowish white, moderately hard, compact, with extremely small pores, extremely fine medullary rays and annual rings marked by the darker colour of the autumn wood

"Himalaya, from Kumaun to Bhutan from 8,000 to 12,000 feet

"E 3406 Tonglo, Darjeeling, 10,000 feet"

" 86, *Celastrus paniculata* To vernacular names *add* "*Kujúri*, Kol,"

" 86 *After* line 5 from the bottom *add* "C 3418, from the Barasand Reserve, Palamow, Chota Nagpore, is the same species as E 2334, but it differs in having no corky bark, but a brown thin bark In the wood the difference is slight and consists merely in smaller pores, and a closer-grained wood. The difference may be only due to climate'

" 87, *Celastrus spinosus.* To numbers *add* "H 2950, Sutlej Valley, Punjab, 3,500 ft'

" 87. *After* "3 **C senegalensis**" *insert*—

"4 **C acuminatus,** Wall, Kurz i. 252 *Gymnosporia acuminata*, Hook f, Hook Fl Ind i 619 *G. Thomsoni*, Kurz, Gamble 19, Vern *Phugong*, Lepcha

[illegible] ite Wood white, [illegible] bands, in struc- [illegible]

"Sikkim Himalaya, and Khasia Hills, up to 5,000 feet

"E 3391. Lebong, Darjeeling, 5,500 feet

Page 113, *Spondias mangifera.* To vernacular names *add* " *Adai,* Gâro ;"

" 113, last line but three. *After* "about Simla." *add* "The silkworm *Actias Silene* is fed upon its leaves."

" 114, *Moringa pterygosperma.* To vernacular names *add* "*Mulgia,* Kól ;"

" 117, line 1. *For* "Wood white." *read* "Wood white, with an irregular grey heartwood."

" 117, line 2. *For* "edge" *read* "edges"

" 117, line 7. *After* "in Europe." *add* "Our Darjeeling specimen shews 12 rings per inch of radius."

" 117. *After* line 8 *add*—

"E 3405. Sandukpho, Darjeeling, 11,000 ft."

" 117, line 10. *After* "and Burma." *add* "It has a smooth yellowish bark, white wood and pores rather scanty, solitary or in radial lines between the fine medullary rays. (E 3311. Pankabari, Darjeeling, 3,000 ft.)"

117, at foot of page, *add*—

"3. **Indigofera stachyodes**, Ldl.; Gamble 25. *I. Dosua,* Ham., *var. tomentosa,* Baker; Hook. Fl. Ind. ii, 102. Vern. *Chiringi jhar,* Nep.

"A small tree with thin brown bark. Wood hard, white, with an irregular dark-coloured heartwood. Pores small to moderate-sized, enclosed in patches of white tissue, forming irregular, sometimes concentric, bands. Medullary rays fine, numerous, equidistant.

"Inner Eastern Himalaya, Khasia Hills, Sylhet.

"E 3359. Rhenokh, Sikkim, 3,000 ft.

"C 3447 from Barasand Reserve, Palamow, Chota Nagpore, is *I. pulchella,* Roxb. Vern. *Uterr,* Kól ; *Jirhúl,* Kharwar. The wood has a structure similar to that of *I. heterantha.*"

" 118, line 17. *After* "Kumaun ;" *insert* "*Hél,* Kól ; *Gurar,* Kharwar ;"

" 118, line 18. *For* "No. 3479" *read* "No. E 479."

" 118, line 19 from the bottom. *After* "Kumaun ;" *add* "*Balashoc,* Mechi ;"

" 118, line 8 from the bottom. *After* "fish." *add* "E 3636 from Bamunpokri, Darjeeling Terai, is this species. It has a thin brown bark and white wood with an irregular dark heartwood. Pores moderate-sized, often subdivided, enclosed in, and often joined by, round concentric rings of white tissue. Medullary rays short, fine to very fine, numerous."

" 119, *Ougeinia dalbergioides.* To vernacular names *add* "*Tinsai,* Gondi ; *Ruta,* Kól ;" and (p. 120) to numbers *add* "C 3477. Saranda Forests, Chota Nagpore."

" 121. *After* line 8 *add* "C 3432 is *Desmodium pulchellum,* Roxb., from Amjheria, Lohardugga, Chota Nagpore, with a yellowish-white, hard wood, annual rings marked by a white line, small pores, and fine white medullary rays ;"

121, line 10. At the end *add* "*Karzani,* Monghyr ; *Kaincho,* Uriya ;"

121, *Erythrina suberosa.* To vernacular names *add* "*Farhud,* Kharwar ;"

" 122, *E. indica.* To vernacular names *add* "*Paldua,* Uriya ; *Pharad,* Monghyr ;"

" 122, line 12 from the bottom. *For* "F 3106" *read* "E 3106 ;" and to numbers *add* "E 3330. Darjeeling, 7,000 ft."

" 122, line 5 from the bottom, *after* "Nep. ;" insert "*Moru, múrrd,* Kól ; *Bandu, durang,* Kharwar ;"

" 123, line 3. *After* "Gondi ;" *add* "*Badúri,* Singrampur ; *Chihúnt,* Monghyr ;"

Page 123, *Butea frondosa* To vernacular names add "*Palashu*, Mechi, *Murut*, Kol, *Pharsa*, Baigas, *Paras, farás*, Behar,'

„ 123, line 26 from bottom *After* "slow matches." *add* "C 979 is a fine specimen of the fibre sent from Berar

, 123, last line but three *After* "Lepcha,' *add* "*Dangshukop*, Mechi"

„ 123, last line *Add* "*F. Chappar*, Ham and *F strobilifera*, R Br, are common shrubs of forest undergrowth Vern *Ulu*, Kól '

„ 124, line 40 *For* '4 Dalbergia Sissoo,' *read* "4 D. Sissoo,"

„ 126 *After* the schedule *add* "Molesworth gives Weight, 52 lbs, P = 760, E = 3,800,' and to numbers "E 3588 Darjeeling Terai'

127, *Dalbergia latifolia* To vernacular names *add* "*Rute*, Kol, *Ruzerap* Mechi, and to numbers *add*—

			lbs
"C 3456	Saidope Reserve, Palamow	.	...
"C 3522	Khurdha Forests, Orissa	.	61
'D 1476	Anamalai Hills, Madras	.	'

, 128, line 4 *For* "W 720 *read* "W 729'

„ 128 *D lanceolaria* To vernacular names *add* "*Piri*, Kól,"

„ 129, *D paniculata* To vernacular names *add* "*Surteli, passi*, Baigas,'

„ 130 At the end of DALBERGIA *add* "C 3450 is *Dalbergia volubilis*, Roxb, from Ramundag Reserve, Palamow Bark thin, brown, peeling off in flakes Wood light brown hard Pores small to very large, scanty Medullary rays very fine, very numerous Occasional faint concentric bands

, 130 In Schedule, last line *For*—

"Bennett, No 1 1872 „ 49 5 827 '

read—

"Bennett No 1 1872 49 5 3 ×1½ ×1½ 830

„ 131, line 12 *For* 'B 584 *read* 'B 548'

„ 132, *Pterocarpus Marsupium* To vernacular names *add* "*Hitun, hid*, Kól, *Beeya, persar*, Kharwar, *Bijo*, Gondi, *Piasal*, Urya,

„ 133, *P Marsupium* To numbers *add*—

"C 3542 Khurdha Forests, Orissa 54 lbs"

„ 133, *Pongamia glabra* To vernacular names *add* "*Khawari, karmuj*, Sirguja,

„ 133 line 10 from the bottom *After* "Beng, *add* "*Nas bél*, C P, and *for* "*golari* *read* "*Golari*

„ 134 *After* line 8 *add* 'No E 3356, from the Sivole Hills, Darjeeling, 1 500 ft, is probably *Ormosia glauca*, Wall, Hook Fl Ind ii 253 Vern *Chuklein*, Lepcha, a large tree of the Central Himalaya. It has a grey bark, and greyish white moderately hard wood The pores are large, scanty, sometimes subdivided, they are joined by irregular, wavy, somewhat anastomosing patches of white, soft tissue The medullary rays are fine to moderately broad, wavy The tree bears a woody pod, filled with bright scarlet seeds, which are used by the Lepchas as a bait to catch jungle fowl

„ 135 At the end of CÆSALPINIA *add* 'C 3460, from Saranda, Chota Nagpore, is *Cæsalpinia sepiaria*, Roxb Vern *Uchay*, Kól, *Gilo*, Uriya It has a yellowish white corky bark, with large corky excrescences, bearing strong thorns The wood is light brown, moderately hard, with masses of reddish brown harder wood near the centre. The pores are large, often subdivided or in groups, surrounded and connected by anastomosing bands of white tissue The medullary rays are fine, very numerous, the distance between them much less than the transverse diameter of the pores '

Page 136, line 13, *for* "Manson" *read* 'Mr. Manson" and line 15, *after* "end." *add* "A large tree measured by the Inspector General at Dalingkote was found to have a girth of 121 inches, a height of 181 feet and 110 feet to the first branch."

" 136, *Cassia Fistula.* To vernacular names *add* "*Hari,* Kól; *Dunrás,* Kharwar; *Jagarúa,* Gondi: *Raella,* Baigas." and *omit* "*persar,* Palamow.", and (p. 137) to numbers *add*—

"C 3544. Khurdha Forests, Orissa . . . 58 lbs."

" 139, line 8. *For* "*Paur, bela,* Gondi;" *read* "*Paur-bela,* Gondi;" and then *add* "*Lamma, rúng,* Kól; *Maulan,* Kharwar;"

" 139, line 17. *After* "Terai." *add* "C 977 is a fine specimen of the fibre sent from Berar. It was examined in 1879 by Mr. Routledge, who reported it to be an excellent, strong fibre, hemp character, and tough, (*Kew Gardens Report, 1879.*)"

" 139, *Bauhinia malabarica.* To vernacular names *add* "*Laba,* Kól;"

" 139, *B. racemosa.* To vernacular names *add* "*Kaimu,* Kól; *Ghatonli,* Oraon; *Katmauli,* Kharwar;"

" 140, *B. purpurea.* To vernacular names *add* "*Buruju,* Kól;"

" 140, *B. variegata.* To vernacular names *add* "*Kurmang,* Mechi; *Singya,* Kól: *Kundol,* Bhumij;" and at the end of the list of numbers (p. 141) *insert* "H 105 from Bhajji, Punjab, 3,000 ft., is also probably this species."

" 141, *B. retusa.* To vernacular names *add* "*Laba,* Kól; *Tewar,* Oraon; *Katman,* Kharwar; *Thaur,* Gondi."

" 142, *Tamarindus indica.* To vernacular names *add* "*Jojo,* Kól; *Chita,* Gondi;"

" 143, line 15 from the bottom. *After* "line." *add* "At the Dehri workshops on the Sone River, it has been used instead of brass for bearings for machinery, and found to wear well. In the Sone river piles of *anjan* have been found after twenty years as sound as when first put in."

" 146, lines 12, 11, and 9 from the bottom. *Omit* the words "two of the species now being grown, *viz.,*" *and* "*P. pallida* of"

" 146. *Omit* the last two lines.

" 147. *Omit* lines 1, 2, 17 to 21.

" 147, *Prosopis spicigera.* To vernacular names *add* "*Somí,* Monghyr; *Perambai,* Madura;"

" 148, line 6. *After* "small tree." *add* "Bark brown, fibrous, deeply fissured vertically."

" 148, *Mimosa rubicaulis.* To vernacular names *add* "*Dandu deta,* Kól; *Arai,* Kharwar;"

" 148, *Xylia dolabriformis.* To vernacular names *add* "*Kongora,* Uriya;" and (p. 149) to numbers *add*—

"C 3514, 3546. Khurdha Forests, Orissa . . 54 lbs."

" 149, line 3. *After* "District," *add* "Orissa,"

" 149, after the schedule *add* "Molesworth gives: Weight 58 lbs., P = 836, E = 4,300."

" 151, line 34. *After* the words "Skinner gives 884." *add* "Molesworth gives Weight 54 lbs., P = 880, and E = 4,150."

" 152, *Acacia leucophlœa.* To vernacular names *add* "*Reúnja, rinja,* Gondi; *Goira,* Uriya;" and to numbers *add* "C 3506. Khurdha Forests, Orissa."

" 154. Above line 19 from the bottom *insert*—

"C 3526. Khurdha Forests, Orissa . . . 62 lbs."

Page 154, line 19 from the bottom. *For* "E 663 *read* ' E 665

" 154, " 7 " " " *For* "locolly' *read* "locally'

" 154, " 6 " " " *For* "F 2355 *read* ' E 2355"

" 154 Below line 4 from the bottom *add* "No 3420 is a piece of hard, dark red wood, resembling this last form in appearance and structure It was obtained from the excavations made at Prince's Dock, Bombay (see Indian Forester, Vol VI, p 108)

" 155 *A Intsia* To vernacular names *add* "*Kundaru*, Kól,"

" 155, line 15 *For* "E 2379' *read* ' E 2359 '

" 155 After line 15 *add* "C 3468, from Bandgaon, Singbhúm, Chota Nagpore, is this species, but the wood is harder and, though recognizable, the angular form of the stem is not so prominent as in the Darjeeling specimens"

" 155 *A pennata* To vernacular names *add* "*Kundaru*, Kól, *Arar*, Kharwar,'

" 156, *Albizzia Lebbek* To vernacular names *add* "*Tinia*, Uriya and (p 157) to numbers *add*—

"C 3560, C 3567 Khurdha Forests, Orissa 49, 59 lbs"

" 158, *A procera* To vernacular names *add* "*Tinia*, Uriya, *Pandrai*, Kol, *Garso*, Kharwar, *Laokri*, Mechi,'

" 159, line 2 *For* "between *A Lebbek* and the woods of *A. procera*" *read* ' between the woods of *A Lebbek* and *A procera*'

, 159, line 10 *For* "P = 884 *read* "P = 695 '

" 160, *A stipulata* To vernacular names *add* "*Chapún, kera serum*, Kól, *Bunsobri*, Mechi,

" 160, *A amara* To vernacular names *add* "*Wusel*, Madura,"

, 164 line 12 *Add* "Vern *Lali*, Nep '

" 164, line 13 *After* "reddish brown *add* "with a pretty wavy lustre on a radial section

" 164, after line 17, *add* "E 3422 Rangirum, Darjeeling, 6,500 ft '

" 165, line 10 from the bottom *After* "Himalaya' *add* "It has a brown thick, soft bark and porous wood with large pores and broad medullary rays (E 3361, Darjeeling, 6 500 ft)

" 166, *Rubus lineatus* To list of numbers *add* "E 3383. Senchul, Darjeeling, 8,000 feet.

" 166, line 17 from the bottom *After* "Roxb Fl Ind ii 513, *add* "Vern. *Kua*, Beng

" 168. *After* line 6 *add* "E 3335 Rangirum, Darjeeling, 6 000 feet."

" 168, at the end of ERIOBOTRYA *After* line 6 *add* "E 3411, from Darjeeling, is *Docynia indica*, Dcne The wood closely resembles that of *Pyrus* Bark ½ inch thick, greyish brown shining, splitting off in irregular flakes and leaving a rough under surface Wood light brown with an irregular purple brown heartwood, hard, close, and even grained Pores very small, more numerous in the spring wood Medullary rays fine, very numerous Annual rings marked by a line Our specimen is a round with a mean diameter of 12 inches, and shewing 36 well-marked rings, the growth, therefore, is 6 rings per inch of radius"

" 169, last line but two *Add* "E 3401 Tonglo, Darjeeling, 10,000 feet (has well marked medullary patches)"

" 170 *After* line 7 at the end of PYRUS *add*—

"E 3403, from Tonglo, Darjeeling, 9,000 feet, is *P. rhamnoides*, Dcne, Hook Fl. Ind ii 377 Vern *Kumbul*, Lepcha, *Kangedoc*, Bhutia, a small, often epiphytic tree of the upper forests of the Sikkim Himalaya. It has a hard, yellowish-

brown wood, with numerous small, evenly distributed pores and very numerous fine medullary rays. The annual rings are marked by a darker line.

"E 3633, from Goompahar, Darjeeling, 7,000 ft., is *P. Wallichii*, Hook. f. It has a greyish-brown bark; and brown, moderately hard wood. Pores numerous, small to moderate-sized, fewer in the autumn wood and thus marking the annual rings. Medullary rays very fine, very numerous, indistinct. Medullary patches few."

"E 3100, from Darjeeling, 7,000 feet, is *Photinia integrifolia*, Ldl.; Hook. Fl. Ind. ii. 381; Gamble 37. Vern. *Shumbul*, Lepcha, a small tree of the Eastern Himalaya. Bark thin, greyish brown. Wood brown, moderately hard, close-grained. Pores small, uniformly distributed. Medullary rays fine, very numerous, the distance between them about equal to the transverse diameter of the pores. Annual rings marked by a sharp line."

Page 173, line 15 from the bottom. *For* "H 3038." *read* "H 3028."

" 174, line 8. *Omit* "H 2912."

" 177, *Carallia integerrima*. To vernacular names *add* "*Júr*, Kól;" and to numbers *add* "C 3182. Saranda Forests, Chota Nagpore."

" 179, line 6. After "Lepcha;" *add* "*Palandu, koldungi*, Kól; *Kundol*, Bhumij; *Buria, raterr*, Kharwar; *Atundi*, Uriya;"

" 179, *Terminalia belerica*. To vernacular names *add* "*Lupúng, lihúng*, Kól;"

" 180, *T. Chebula*. To vernacular names *add* "*Rola*, Kól; *Hadra*, Oraon;" and (p. 181) to numbers *add*—

"C 3531. Khurdha Forests, Orissa . . . . 59 lbs."

" 182, *T. tomentosa*. To vernacular names *add* '*Hatana*, Kól;' and to numbers "E 3590. Darjeeling Terai."

" 184, *T. Arjuna*. To vernacular names *add* "*Gara hatana*, Kól;" and (p. 185) to numbers *add*—

"C 3161. Saranda Forests, Chota Nagpore . . 69 lbs."

" 185, *Anogeissus latifolia*. To vernacular names *add* "*Hesel*, Kól;" and (p. 186) to numbers *add*—

"C 3562. Khurdha Forests, Orissa . . . . 62 lbs."

" 186, *A. acuminata*. To vernacular names *add* "*Gara hesel, pandri, pansi* Kól;" and (p. 187) to numbers *add* "C 3462. Saranda Forests, Chota Nagpore."

" 187, line 23. *After* "A deciduous tree." *add* "Bark thin, greyish white, smooth."

" 187, *Gyrocarpus Jacquini*. To numbers *add* "C 3517. Sonakalla, Khurdha, Orissa."

" 190, line 26. *For* "1095-7" *read* "1095-8" and *for* "2, 3, 4" *read* "2, 3, 4, 5."

" 190, *Psidium Guava*. To vernacular names *add* "*Gaya*, Magh;"

" 193, *Eugenia formosa*. To vernacular names *add* "*Panchidung*, Gáro;"

" 194, *E. operculata*. To vernacular names *add* "*Topa*, Kól;"

" 194, *E. Jambolana*. To vernacular names *add* "*Kuda*, Kól; *Jambún*, Oraon;" and to numbers 'E 3598, Darjeeling Terai.'

" 195. *E. Heyneana*. To vernacular names *add* "*Gara kuda*, Kól; *Jamti*, Kharwar;"

" 195. At the bottom of the page, *add* "E 3439, from the Ramundag Reserve, Palamow, Chota Nagpore, is this species. The white concentric bands are more prominent and enclose the pores."

" 196, after line 5, *add* "No. C 3582, from the Khurdha Forests, Orissa, is probably *E. zeylanica*, Wight. Vern. *Sagarabatna*, Uriya. It is a small myrtle-like shrub of the scrub forests. Bark brown. Wood hard,

close grained, grey Pores small and extremely small, joined by concentric bands of white tissue, which are closely packed Medullary rays very fine, very numerous

Page 196, *Barringtonia acutangula* To vernacular names *add* "*Ijar*, Monghyr, *Saprung*, Kól, *Hinjara*, Uriya" To numbers *add* "C 3470, Saranda Forests, Chota Nagpore."

„ 197. *Careya arborea* To vernacular names *add* "*Asunda*, Kól, *Kum*, Bhumij,"

„ 197, in schedule, line 8 from the bottom, column 5, *omit* the word "Various

„ 197, in schedule, line 4 from the bottom, column 5, *for* "2 × × 1" *read* "2 × 1 × 1"

„ 198, line 9 *After* "astringent" *add* "C 980 is a fine specimen of the fibre sent from Berar"

„ 199 At the end of MELASTOMA *add*—

"E 3419, from Lebong, Darjeeling, 5,000 feet, is *Oxyspora paniculata*, DC Bark reddish brown, thin. Wood light reddish-grey, moderately hard, with dark brown medullary patches Pores small to moderate sized, scanty, often in short radial lines Medullary rays fine, short, numerous, not straight Concentric bands of soft tissue, often interrupted, prominent.

"C 3561, from the Khurdha Forests, Orissa, is *Memecylon edule*, [illegible] l, consisting [illegible] and lighter [illegible] layers may [illegible] larger fine and short, the smaller extremely fine Weight, 60 lbs per cubic foot"

„ 199, line 13 from the bottom *For* "*Atlacus*" *read* "*Attacus*,

„ 200, *Woodfordia floribunda* To vernacular names *add* "*Icha*, Kól, *Dadki*, Bhumij, *Harwari*, Uriya"

„ 200, *Lagerstromia parviflora* To vernacular names *add* "*Saikre*, Kól, *Sidha* Behar," and (p 201) to numbers *add*—

"C 3547. Khurdha Forests, Orissa . . 58 lbs"

„ 202 *L Reginæ* To vernacular names *add* "*Gara saikre*, Kól,"

„ 202, line 10 from the bottom *After* "Ratnagiri." *add* "Saranda forests in Chota Nagpore"

„ 203, *L Reginæ* List of Numbers *For* "E 620" *read* "E 630" and *after* "E 2188 Nowgong Assam" *add* "E 1433 Assam"

„ 204, *Duabanga sonneratioides* To vernacular names *add* "*Achúng*, Gáro," and to numbers "E 3622 Kalimpung, Darjeeling, 2,000 ft"

„ 204, line 20 from bottom *After* "radius" *add* "Our specimen No E 3622 shews only 2 rings per inch."

„ 205 *Sonneratia acida*. To numbers *add*—

"B 3379, from Kyoukphyoo, Arracan . . 42 lbs"

„ 206, *Casearia tomentosa*. To vernacular names *add* "*Rore*, Kól, *Beri*, Kharwar," and to numbers *add*—

"C 3527 Khurdha Forests, Orissa . . . . 43 lbs"

„ 206, line 23 *For* "O 1393" *read* "O 1363"

„ 206, *C. graveolens* To vernacular names *add* "*Reri*, Kól, *Beri*, Kharwar,"

„ 208, line 7 *For* "Bark grey-brown, wrinkled" *read* "Bark greyish white, one inch thick, spongy, marked with horizontal wrinkles and small vertical lines of lenticels peels off in thin papery layers."

„ 209 line 2. *After* "Cachar," *add* "*Arengi banu*, Kól,"

Page 209, line 6. *After* "H. f and Th.;" *add* "Hook. Fl. Ind. ii. 740."

,, 209, line 7. *For* "eastern slopes of the Arracan Yoma." *read* "Khasia Hills and the Eastern, &c."

,, 209, at the end of HEPTAPLEURUM *add* "C 3442, from Neturhát, Palamow, 3,000 feet, is *Heptapleurum venulosum*, Seem. Vern. *Sukriruin*, Kól. Bark grey, shining. Wood light brown, soft. Pores small. Medullary rays fine to moderately broad."

"E 3635 from Goompahar Forest, Darjeeling, 7,500 ft., is *H. impressum*, C. B. Clarke. Bark brown, thick, exuding a copious gum. Wood grey, soft. Pores very small, evenly distributed. Medullary rays prominent, moderately broad. Conspicuous concentric white lines which run into each other. Annual rings doubtful.

,, 210. At the end of BRASSAIOPSIS *add* "E 3409, from Darjeeling, 6,700 feet, is *Brassaiopsis speciosa*, Dcne. and Plch.; Hook. Fl. Ind. ii. 737 (*B. floribunda*, Seem.; Gamble 44), a moderate-sized tree, with thin grey bark, and soft white wood, in structure resembling that of *B. mitis*. Growth fast, 5 rings per inch of radius."

,, 210, line 10. *After* "Miq.;" *add* "Hook. Fl. Ind. ii. 738."

,, 210, line 11. *For* "Martaban Hills above 5,000 feet" *add* "Eastern Himalaya, Khasia and Martaban, &c."

,, 210, line 12. *After* "Seem.;" *add* "Hook. Fl. Ind. ii. 738."

,, 210, line 24. *After* "Linn.;" *add* "Hook. Fl. Ind. ii. 739."

,, 210, at the end of HEDERA *add*—

"E 3402, from Tonglo, Darjeeling, 9,000 feet, is *Gamblea ciliata*, C. B. Clarke; Hook. Fl. Ind. ii. 740. Vern. *Rama*, Bhutia, a large tree of the forests of the Senchul and Singalila Ranges above 8,000 feet. Bark grey, smooth. Wood white, shining, moderately hard. Pores extremely small, except on the outer edges of the annual rings, which are very distinctly marked by lines of moderate-sized pores. Medullary rays fine and moderately broad, white, shining, irregularly distributed.

"E 3576, from Darjeeling, 6,000 feet, is *Pentapanax racemosum*, Seem. A large climbing or straggling shrub. Bark silvery grey, thin, peeling off in thin flakes. Wood greyish white, soft. Annual rings very prominently marked by a line of large pores: the pores in the rest of the wood small, scanty. Medullary rays moderately broad."

,, 211, line 2. *After* "*Torricellia tiliæfolia*, DC.;" *add* "Hook. Fl. Ind. ii. 748;"

,, 211, line 4. *After* "Khasia Hills." *add* "(See p. 81, *Daphniphyllopsis capitata*)."

,, 211, line 11. *After* "Thwaites;" *add* "Hook. Fl. Ind. ii. 741;"

,, 211. *Alangium Lamarckii*. To vernacular names *add* "*Ankol*, Kól; *Ankula*, *dolanku*, Uriya;" and to numbers *add*—

		lbs.
"C 3466.	Saranda Forests, Chota Nagpore . . .	...
"C 3564.	Khurdha Forests, Orissa	42"

,, 211, line 33. *After* "Roxb. Fl. Ind. ii. 261;" *add* "Hook. Fl. Ind. ii. 743;"

,, 212, line 5. *After* "Linn.;" *add* "Hook. Fl. Ind. ii. 744;"

,, 212, line 9. *After* "Wall.;" *add* "Hook. Fl. Ind. ii. 744;"

,, 212, line 24. *After* "Wall.;" *add* "Hook. Fl. Ind. ii. 744;"

,, 212, line 36. *After* "Wall.;" *add* "Hook. Fl. Ind. ii. 745;"

,, 213, line 11. *After* "Hook. f. and Th.;" *add* "Hook. Fl. Ind. ii. 747;"

Page 215, *Viburnum erubescens* To vernacular names *add* ' *Asari* Nep , *Nakouli*, Bhutia ,'

„ 217, last line but 8 *For* " E 2866 ' *read* " E 2856

, 219, *Anthocephalus Cadamba* To vernacular names *add* " *Sanko*, Kól ,'

„ 220 *Adina cordifolia* To vernacular names *add* " *Ki rumba*, *Komba*, Kol ,"

„ 220, last line but 2 *For* " *Hnanbeng*' *read* " *Hnaubeng*'

„ 221, *A cordifolia* To numbers, *add*—

" C 3543 Khurdha Forests, Orissa . 43 lbs '

„ 222 in page number *For* ' 22d' *read* ' 222"

, 222 *Stephegyne parvifolia.* To vernacular names *add* " *Gui komba*, Kól, *Guri*, *guri karam*, Kharwar ,' and to list of numbers *add*—

" C 824 Bairagarh Reserve, Berar."

, 224 *Hymenodictyon excelsum* To vernacular names *add* " *Sali*, Kól, *Burkunda*, Bhumij , *Konso*, Uriya ,

„ 225 After line 7, *add*—

" C 3565 Khurdha Forests, Orissa . 29 lbs '

„ 226, *Webera asiatica* To numbers *add* " C 3579, C 3520 Khurdha Forests, Orissa Vern *Jhaujhauka*

, 226 *Randia uliginosa* To vernacular names *add* *Kumkum*, Kól, '

, 227, *R dumetorum* To vernacular names *add* " *Portoho*, Kol, *Mohna*, Kharwar ,"

„ 227. At the bottom of the page *add* " E 3363 from Dhupguri, W Dúars, is *R rigida*, DC The wood resembles in structure that of *R uliginosa*

, 228, *Gardenia turgida* To vernacular names *add* ' *Duduri* Kol , *Kharhar*, Oraon, and to numbers *add* " C 3435 Kumandi Reserve, Pala mow

„ 228 After G. LUCIDA, at the bottom of the page, *add* " C 3465, from Bandgaon, Singbhum, Chota Nagpore, is *G gummifera*, Linn Vern *Bururi*, *burui* Kol , *Bruru*, Bhumij Bark brown, nearly ¼ inch thick Wood yellowish white, hard, close grained Annual rings indistinct Pores very small Medullary rays very fine, very numerous This wood might serve as a substitute for boxwood '

„ 229 *G latifolia* To vernacular names *add* ' *Papra*, *papadar*, Kol , *Popra*, Kharwar ,

„ 229, lines 17, 18 *For* " B ' *read* " C "

, 229 At the end of GARDENIA *add* " E 3286, from the Rinkheong Reserve, Chittagong, is *Hyptianthera stricta*, W and A Bark brown, somewhat corky, thin, cleft in long continuous furrows about 2 lines apart Wood brown, moderately hard close grained Pores small, evenly distributed Medullary rays of two classes small ones very fine, very numerous , larger ones few, fine. Our specimen weighs 56 lbs per cubic foot '

„ 230, *Plectronia didyma* To vernacular names *add* " *Jor*, Kól ,'

, 230, line 11 *For* " grey" *read* " light brown ,"

„ 230, *P didyma* To numbers *add* " C 3481 Saranda Forests, Chota Nagpore "

, 230, *Ixora parviflora* To vernacular names *add* " *Pete*, Kól ,' and to numbers *add*—

" C 3161 Saranda Forests, Chota Nagpore '

„ 231, *Pavetta tomentosa* To vernacular names *add* " *Sikriba*, *sikerúp*, Kól, *Burhi*, Kharwar ,'

„ 231, line 22 *After* " Gamble 49 *insert* " The Coffee plant "

Page 232, *Morinda exserta*. To numbers *add*—

"C 3535. Khurdha Forests, Orissa . . . 40 lbs."

„ 232. At the end of MORINDA *add* "C 3431 from Amjheria, Lohardugga, is *Hamiltonia suaveolens*, Roxb. Vern. *Kudia*, Kharwar. It has a grey, shining bark, which peels off in short papery flakes. The wood is dark grey, soft, porous, with few small pores often subdivided, and moderately broad to broad medullary rays."

„ 233, line 13. *For* "Weight, 31·5 lbs." *read* "Weight, our specimen gives 27 lbs."

„ 233, last line but one. *For* "*Thibandia*" *read* "*Thibaudia*"

„ 235, line 25. *For* "E 3328" *read* "E 3325"

„ 237, line 9. *After* "*Kégu*," *add* "*kalma*,"

„ 238. At the end of RHODODENDRON *add* "No. E 3394, *Gaultheria Griffithiana*, Wight, from Jalapahar, Darjeeling, 7,500 feet, has a moderately hard, greyish-white wood, with numerous brown medullary spots. Pores extremely small and numerous. Medullary rays fine, scanty. The bark is light brown, peeling off in papery layers."

„ 240. *After* line 25, *add* "C 3438 from Ramundag Reserve, Palamow, and C 3528 from the Khurdha Forests, Orissa, are this species, but the bark is thinner, and the wood differs by having the medullary rays only 'broad' instead of 'extremely broad.'"

„ 241. At the end of ARDISIA *add* "E 3350, from the Sivoke Hills, Darjeeling, 1,500 feet, is *A. involucrata*, Kurz; Gamble 53. Vern. *Denyok*, Lepcha. It has a yellow corky bark and pinkish-white wood; with small, scanty pores, and broad, white, wavy medullary rays.

"E 3367, from the Kasalong Reserve, Chittagong, is *A. paniculata*, Roxb. Fl. Ind. i. 580; Beddome cxxxviii.; Kurz ii. 107, a small tree of Chittagong with handsome pink flowers. The bark is thin, greyish brown; and the wood pinkish white, with small pores radially disposed between the short, broad, wavy medullary rays.

"C 3463, from Bandgaon Ghât, Singbhúm, Chota Nagpore, 2,000 feet, is a species of *Ardisia*, probably *A. solanacea*, Willd. Bark brown, smooth. Wood grey, moderately hard. Pores small and very small, often in short radial lines between the broad, wavy, porous medullary rays."

„ 242. At the end of SARCOSPERMA *add* "C 3504, from the Khurdha Forests, Orissa, is *Sideroxylon tomentosum*, Roxb. Vern. *Kanta bohul*, Uriya. Bark light reddish-brown, thin. Wood light reddish-white, hard. Pores fine to moderate-sized, in short concentric or sometimes oblique lines. Medullary rays very fine, very numerous, equidistant. Concentric bands of rather darker colour having the appearance of annual rings."

„ 243, *Bassia latifolia*. To vernacular names *add* "*Mandukum*, Kól; *Mohúl*, Bhumij;"

„ 246, *Mimusops indica*. To numbers *add*—

"C 3551. Khurdha Forests, Orissa . . . 72 lbs."

„ 249. *Diospyros Melanoxylon*. To vernacular names *add* "*Tiril*, Kól;"

„ 249, *D. Melanoxylon*. To numbers *add* "C 3493. Kolhán Forests, Singbhúm, Chota Nagpore."

„ 250, last line but 5. *For* "No. 62" *read* "No. 61"

„ 251, *D. Ebenum*. To numbers *add* "W 1207. South Kanara (saplings)."

„ 252, line 18. *For* "white" *read* "grey"

Page 252, *D Embryopteris* To numbers *add* "C 3474 Saranda Forests, Chota Nagpore

„ 253 *After* line 9, at the end of EBENACEÆ, *add* "C 3502, from the Khurdh Forests, Orissa, is *Maba buxifolia*, Pers Vern *Guakoli*, Uriya Bark greyish black, thin Wood greyish white, moderately hard, Pores small, scanty, in short radial lines Medullary rays very fine, numerous and equidistant Concentric lines of white tissue, thin, very numerous and regular. In Orissa it is a very common bush on poor soils"

„ 253 *After* line 24 *add* "E 3372, Darjeeling, 6,000 feet, has a similar structure, but the white bands are much less marked It is probably *S serrulatum*'

, 254, at the end of SYMPLOCOS *add*—

"E 3347, Darjeeling, 6,000 feet is *Symplocos glomerata*, King It has a thin brown bark and white wood resembling in structure that of *S lucida*."

"C 3491, from the Kolbán Forests, Singbhúm, Chota Nagpore, is *S racemosa*, Roxb Vern *Ludum*, Kól, *Lodh*, Oraon Bark yellow, rough, spongy, ⅜ inch thick Wood white, soft Pores small, often in radial lines Medullary rays short, broad, numerous"

„ 254, last line *After* "Beng ,' *add* "*Samsihar*, Kharwar, *Saparúng*, Kól,"

„ 255, *Schrebera swietenioides* To vernacular names *add* "*Jarjo, sandapsing*, Kól, *Ghato*, Oraon, *Ghanto*, Kharwar,"

„ 256, *S swietenioides* To numbers *add* "C 3454 Ramundag Reserve, Palamow, Chota Nagpore.'

„ 256, line 35 *After* "*Shang*, Afg ,' *add* "*Banafsh*, Kandahar,"

„ 256, line 40 *After* "good fuel" *add* "Experiments, made at Kandahar by Captain Call, R E, with pieces 1 × 1′ × 1″, gave for the average weight 32 2 lbs and 641 for the value of P (Indian Forester, Vol V, p 480)'

„ 259, after line 17, *add*—

"C
probably
i 108)
brown
sized, oft
equidistant, the distance between them equal to, or *less* than, the diameter of the pores Fine concentric lines of white tissue, which may be annual rings"

„ 259, at the end of LINOCIERA *add*—

"C 3412 from Hazaribagh, and C 3492 from Kolbán, Singbhúm, Chota Nagpore, are *Nyctanthes Arbor-tristis*, Linn Bark ¼ inch thick, light brown, rough Wood yellowish-brown, moderately hard, close-grained Pores small, grouped in short radial lines, but arranged more or less in concentric rings, the annual rings apparently marked by a dark line and a more complete ring of pores Medullary rays very fine to fine, very numerous, the distance between them equal to the transverse diameter of the pores'

„ 261, *Carissa diffusa*. To vernacular names *add* "*Kanuwan*, Oraon, *Anka koli*, Uriya," and to numbers *add* "C 3518. Khurdha Forests, Orissa"

„ 261, at the

Page 262, *Alstonia scholaris*. To vernacular names *add* "*Chatin, bomudu*, Kól; *Chhatiana*, Uriya;"

,, 263, *Tabernæmontana coronaria*. To vernacular names *add* "*Chameli*, Monghyr;"

,, 263, *Holarrhena antidysenterica*. To vernacular names *add* "*Korkoria*, Oraon; *Kurchi*, Bhumij; *Towa, kuti*, Kól; *Kuria*, Kharwar; *Pita korwa*, Uriya;" and to numbers *add*—

"C 3558. Khurdha Forests, Orissa . . . 39 lbs."

,, 264, *Wrightia tomentosa*. To vernacular names *add* "*Sandikuya*, Kól; *Dudh-koraiya*, Monghyr;"

,, 265. *After* line 2 *add* "C 3496, from Chaibassa, Chota Nagpore, is *Thevetia neriifolia*, Juss. Bark thin, greyish brown, shining. Wood grey, moderately hard. Pores very small and small, numerous. Medullary rays very fine, very numerous, the distance between them less than the transverse diameter of the pores."

,, 265, line 29. *After* "*Auk*, Nep.;" *add* "*Akhwan*, Kharwar; *Palati*, Kól; *Uruk*, Uriya:"

,, 265, at line 17 from the bottom. *After* "purposes." *add* "C 3446, from the Barasand Reserve, Palamow; and C 3512, from Burkool, Khurdha, Orissa, are *Calotropis gigantea*. The bark is light yellowish-white, consisting chiefly of cork, and deeply cleft vertically. Wood white, soft. Pores small to moderate-sized, often subdivided, scanty. Medullary rays extremely fine and numerous."

,, 268, line 20. *For* "Burman" *read* "Burm., an"

,, 268, line 35. *For* "Bark $\frac{1}{10}$ inch thick .... scales" *read* "Bark $\frac{1}{2}$ to $\frac{3}{4}$ inch thick, black or brownish black, corky, very deeply and narrowly cleft vertically, so as to form thin ridges which easily break off."

,, 269, *Strychnos potatorum*. To numbers *add* "C 3500. Khurdha Forests, Orissa."

,, 269, *S. Nux-vomica*. To vernacular names *add* "*Kuchila*, Uriya;" and to numbers, *add* "C 3537 (63 lbs.), C 3538 (54 lbs.). Khurdha Forests, Orissa."

,, 269. At the end of line 11 from the bottom *add* "C3475, from the Koel River, Saranda, Chota Nagpore, is *Rhabdia viminea*, Dalzell. It has a soft white wood, with scanty pores, often subdivided or in short radial lines. Medullary rays extremely fine, very indistinct."

,, 270, *Cordia Myxa*. To vernacular names *add* "*Embrúm*, Kól;"

,, 271. *C. Macleodii*. To vernacular names *add* "*Renta, porponda*, Kól; *Bharwar, belaunan*, Kharwar; and to numbers *add* "C 3455. Betlah Reserve, Palamow."

,, 273. After line 13 *add* "C 3497, from Ghatsila, Dhalbhúm, is *Erycibe paniculata*, Roxb. Vern. *Urumin*, Kól, a climber, with the peculiar structure of climbers: soft porous wood, large pores and moderately broad medullary rays. The woody portions are arranged in wavy concentric masses, separated by lines of cellular tissue. The bark is brown with corky lenticels."

,, 275, *Oroxylum indicum*. To vernacular names *add* "*Sona*, Hazaribagh; *Sanpatti*, Monghyr; *Arengi banu*, Kól; *Sonepatta*, Kharwar; *Phunphuna*, Uriya;"

,, 275, line 31. *For* "E 2396." *read* "E 2395."

,, 277, line 3. *After* "Ceylon Collection" *add* "(marked *Spathodea longifolia*. Vern. *Daanga*, Cingh.)"

,, 278, *Stereospermum chelonoides*. To vernacular names *add* "*Kandior*, Kól;"

278, *S. suaveolens*. To vernacular names *add* "*Kandior*, Kól; *Pandri*, Kharwar;" and (p. 279) to numbers *add* "O 1378. Gonda, Oudh."

Page 279, line 16 from the bottom *For* "B 2355" *read* "B 2235"

„ 280, line 6 from the bottom *For* "*Ban marua*' *read* "*ban marua*"

„ 280, foot-note. *For* "Linn , Soc. *read* "Linn Soc."

„ 281, *Adhatoda Vasica* To vernacular names *add* "*Basung*, Uriya,"

„ 282, *Callicarpa arborea*. To vernacular names *add* "*Búndún*, Kól, *Bogodi, gogdi*, Kharwar, *Boropatri*, Uriya," and to numbers *add* "C 3445 Seemah Reserve, Palamow, Chota Nagpore"

„ 292 Before line 5 from the bottom *insert* "C 1204 Khandwa, Central Provinces"

„ 295 At the end "of PREMNA *add* "C 3578, from the Khurdha Forests, Orissa Vern *Agabathu*, Uriya, is a species of *Premna*, near *P latifolia*, which it resembles in structure Bark light yellowish-brown, thin"

„ 295, *Gmelina arborea* To vernacular names *add* "*Kasamar*, Kól," and (p 296) to numbers *add*—

"C 3549 Khurdha Forests, Orissa . 37 lbs

"E 3605, E 3620 Darjeeling Terai"

„ 297, *Vitex Negundo* To vernacular names *add* "*Ehúri*, Kól, *Sindwar*, Kharwar, *Samálu*, Monghyr,"

„ 297, *V. altissima* To vernacular names *add* "*Simyanga, gua*, Kól,"

„ 297, *V. pubescens* To vernacular names *add* "*Muria*, Uriya,' and to numbers (page 298) *add*—

"C 3550. Khurdha Forests, Orissa . . 52 lbs"

„ 299, line 3. *After* "Mechi," *add* "*Kvla marsal*, Kól, *Anguti*, Uriya,"

„ 302, NYCTAGINEÆ At end *add* "C3507, from the Khurdha Forests, Orissa, is *Pisonia aculeata*, Linn Vern *Hati ankusa*, Uriya It has a very
[illegible] rranged, very large, single
[illegible] 2 or 3 moderate sized pores
[illegible] e medullary rays are very
[illegible] and subdivide the pores

„ 309, *Machilus odoratissima* To numbers *add* "E 3634 Darjeeling, 7,000 ft.'

„ 310, line 25 *For* "O 1378," *read* "O 1373'

„ 310, *Tetranthera monopetala* To vernacular names *add* "*Pojo, hajam*, Kól,"

„ 311. After [illegible] ...issa, is
[illegible] Bark
[illegible] rained.
[illegible] oughly
[illegible] ked by
[illegible] ead'

„ 313, line 11 *After* "42 lbs ' *add* "This species is not a *Daphnidium*, but *Lindera heterophylla*, Meissn'

„ 325, line 23 *For* "E 3377' *read* "E 3317."

„ 327, *Streblus asper* To vernacular names *add* "*Hara saiyung*, Kól," and to numbers *add* "C 3577 Khurdha Forests, Orissa.'

„ 327, *Plecospermum spinosum* To vernacular names *add* "*Banabana*, Uriya,'

„ 329, line 16 *For* "E 3376" *read* "E 3396."

„ 329, *Artocarpus integrifolia* To vernacular names *add* "*Porós*, Kól,"

„ 330, *A. Lakoocha* To vernacular names *add* "*Dao*, Kól,"

„ 331, line 7 from bottom *For* "W 755" *read* "W 758' and after line 7 from the bottom *insert* "W 1208 South Kanara (*saplings*)"

, 332, line 30 *Omit* "and W 720 from South Kanara," and *for* " *read* "resembles

Page 333, *Ficus bengalensis.* To vernacular names *add* "*Bai*, Kól;"
" 334, *F. infectoria.* To vernacular names *add* "*Baswesa*, Kól;"
" 335, *F. religiosa.* To vernacular names *add* "*Hesar*, Kól; *Jari*, Uriya;"
" 336, *F. retusa.* To vernacular names *add* "*Butisa*, Kól;"
" 338. *F. virgata.* To numbers *add* "H 148. Sainj, Simla, 3,000 feet."
" 339, *F. Cunia.* To vernacular names *add* "*Riu, ain*, Kól; *Poro dumer*, Kharwar;"
" 339. *F. glomerata.* To vernacular names *add* "*Lóa*, Kól; *Dumer*, Kharwar;"
" 340, *F. Roxburghii.* To vernacular names *add* "*Kotang*, Kól;"
" 340, *F. hispida.* To vernacular names *add* "*Kotang, sosokera*, Kól;"
" 341, at the end of Ficus *add*—

"E 3334 from Darjeeling, 7,000 ft., is *F. Fieldingii*, Miq., a common tree of the Hill forests of the N. E. Himalaya, whose leaves are much used for fodder. It has a thin, grey bark; wood white, close grained, soft. Pores moderate-sized, very scanty. Alternating wavy bands of soft and firmer tissue prominent. Medullary rays short, moderately broad.

"E 3612 from Chenga Forest, Darjeeling, 1,500 ft., is *F. clavata*, Wall. It has a very thin, smooth, greenish-grey bark. Wood white, moderately hard, close-grained, lustrous. Pores moderate-sized, scanty, often subdivided and enclosed in a ring of white tissue. Alternating layers of white, soft, and firmer dark tissue, very regular. Medullary rays fine to moderately broad, very short, white."

" 341, line 12. *For* "2075" *read* "2975."
" 342, *Ulmus integrifolia.* To vernacular names *add* "*Daurango*, Uriya;"
" 344, *Sponia orientalis.* To vernacular names *add* "*Rarunga*, Kól;"
" 347, line 18 from the bottom, *after* "Beng.;" *add* "*Hara sejum*, Kól; *Sikat*, Kharwar; *Mahkoá*, Monghyr;"
" 348, line 27, *after* "Vern." insert "*Simul aloo, simul turúl*, Beng.;"
" 349, *Antidesma Ghæsembilla.* To vernacular names *add* "*Mata suré*, Kól;"
" 352, *Phyllanthus Emblica.* To vernacular names *add* "*Meral*, Kól;" and to numbers *add*—

"C 3539. Khurdha Forests, Orissa . . . 58 lbs."

" 353. At the end of "Phyllanthus," *add* "C 3485, from the Kolhán Forests, Singbhúm, Chota Nagpore, and C 3501 and C 3553, from the Khurdha Forests, Orissa, are *Phyllanthus lanceolarius*, Müll. Arg. Vern. *Marang mata*, Kól; *Kalchua*, Uriya. Bark brown, longitudinally cleft, soft. Wood reddish brown, moderately hard. Pores small and moderate-sized, scanty, in radial lines between the fine medullary rays. The distance between the rays is equal to, or less than, the transverse diameter of the pores. Weight, our specimen 'C 3553' gives 56 lbs. per cubic foot.

"C 3451, from the Betlah Reserve, Palamow, is *Breynia rhamnoides*, Müll. Arg. Bark greyish brown, fibrous. Wood reddish brown, hard, close-grained. Pores small, in radial lines between the numerous, fine medullary rays."

" 353, last line. *For* "E 5469" *read* "E 2469."
" 356, *Briedelia retusa.* To vernacular names *add* "*Kharaka, kaka*, Kól; *Karika*, Bhumij; *Kanj, kaji*, Kharwar; *Káj*, Monghyr;"
" 357, line 8. *After* "Ceylon Collection" *add* "(marked *B. spinosa.* Vern. *Kettekale*, Cingh.)"
" 357. *Briedelia tomentosa.* To numbers *add* "C 3498. Dhalbhúm, Chota Nagpore."

Page 357. At the end of BRIEDELIA *add* "C 3503 from the Khurdha Forests, Orissa, is *Briedelia stipularis*, Bl Vern *Gour kassi*, Uriya Bark brown. Wood greyish brown, moderately ha
or in short radial lines Medullar
distributed, the distance between t
meter of the pores Numerous very fine, concentric, transverse bars across the rays"

" 358, *Lebedieropsis orbicularis* To vernacular names *add* "*Parasu, pás*, Kól, *Kergaili*, Kharwar," to numbers *add* "C 3452. Betlah Reserve, Palamow, Chota Nagpore;" and in line 18 after "poisonous," *add* "and in Singbhúm is so used by the Ho Kols, as also the root, mixed with salt."

" 359, line 9, *after* "Nep," *add* "*Kurti, konya, kuli*, Kól, *Putila*, Bhumij, *Putri*, Kharwar, *Puter*, Monghyr,"

" 359, *Croton caudatus.* To vernacular names *add* "*Wusta*, Uriya,"

" 359, line 5 from bottom. *After* "smaller" *add* "C 3458, from Chandwa, Tori, Chota Nagpore, is this It has a yellow wood, pores moderate sized, scanty, single or subdivided, or in groups of 3 to 4, and medullary rays fine and very fine, very numerous Wavy concentric bands of white tissue"

" 359, *Trewia nudiflora* To vernacular names *add* "*Kurong*, Nep, *Gara lohadaru*, Kol, *Gamhár*, Monghyr, *Monda*, Uriya"

" 363 *Ricinus communis* To vernacular names *add* "*Bindi*, Kól,"

" 365, *Jatropha Curcas.* To vernacular names *add* "*Kulejera, totka bendi*, Kól,"

" 366. *After* CHÆTOCARPUS *insert* "C 3548, from the Khurdha Forests Orissa, is *Gelonium lanceolatum*, Willd., Roxb Fl Ind iii 831, Beddome ccxiv Vern *Kakra*, Uriya, *Suragada*, Tel. It is a pretty evergreen tree of the Eastern Circars and Orissa, and has a yellow, smooth, close and even grained wood, which weighs 50 lbs per cubic foot and has a peculiar waxy smell The pores are moderate sized, scanty, sometimes subdivided The medullary rays are very fine, very numerous, and are joined by very faint, fine, white lines Growth moderate, 6 rings per inch of radius"

" 369 *After* line 3 *insert* "C 3509, from Khurdha Forests, Orissa, is *Euphorbia Tirucalli*, Linn Vern *Séju* Bark brown or greenish brown Wood white or grey, moderately hard Pores small, single or subdivided, scanty. Medullary rays extremely fine and numerous"

" 369, line 5 *After* "Baillon" *add* "The Box Tree"

" 372, line 17 from the bottom *After* "roofing houses" *add* "(H 130, Rotang Pass, Kulu, 9,000 ft)"

" 372, line 10 from the bottom *For* "E 2404" *read* "E 2403"

" 373, line 6 *For* "E 2914" *read* "E 2904", and line 7, *for* "E 2405" *read* "E 2404"

" 374, line 13 *For* "E 2406." *read* "E 2405"

" 375, line 12. *For* "*S serphyllum*" *read* "*S serpyllum*"

" 375, *Salix tetrasperma* To vernacular names *add* "*Nachal*, Kól, *Cheur*, Kharwar,"

" 379, line 18 *For* "H 3138" *read* "H 3188"

" 380, line 8 *For* "*Vulgaris*" *read* "*vulgaris*" and line 9, *for* "*Castanea Vesca*" *read* "*Castanea vulgaris*"

" 384, *Quercus dilatata.* To numbers *add* "H 777. Kalatop Forest, Punjab, 7,000 ft"

" 386, *Q. acuminata* To numbers *add* "E 3384, Darjeeling, 6,500 ft"

Page 392, *Juglans regia.* To numbers *add* "H 7. Theog, Simla, 5,000 ft."

„ 392, line 3 from the bottom. *For* "H 41" *read* "H 35."

„ 393, *after* line 4 *add* "E 3587, E 3632, Darjeeling, 7,000 ft. The latter is from a planted tree and shews 15 rings to a radius of $4\frac{1}{2}$ inches, or $3\frac{1}{4}$ rings per inch of radius."

„ 408, line 8. *For* "H 2898." *read* "H 2896."

„ 409, after line 26, *add* "Our No. E 2437 shewed, on the round, a mean diameter of 22 inches corresponding to 134 years or 13 rings per inch of radius. This agrees with several other measurements made in the Singalila Forests in Darjeeling, though at a lower elevation the growth is faster. Twelve rings per inch may be, therefore, taken as an average rate of growth for the Sikkim Silver Fir forests."

„ 410 line 16. *After* "above Ghát." *add* "*C. Lawsoniana*, Murray, is cultivated and grows well at and around Darjeeling."

„ 410, line 6 from the bottom. *After* "Gamble 83." *add* "The Funereal Cypress."

„ 411, line 10. At the beginning *add* "E 3615 from Rangiiúm, Darjeeling, 7,000 ft., and" and *for* "is" *write* "are"

„ 411, line 20. *After* "Wood soft," *add* "white, with a brown, often almost black, heartwood,"

„ 412, last line. *For* "H 127." *read* "H 129."

„ 415, line 8, *after* "Cuttack," *add* "*Rengua*, Uriya." and in line 10, *for* "Mid." *read* "Miq."

„ 418, line 11. *For* "talll" *read* "tall"

„ 419, line 6. *After* "Hind.;" *insert* "*Keeta*, Kól;"

„ 421, line 14 from the bottom. *For* "ENTINCKIA" *read* "BENTINCKIA"

„ 423, *Calamus tenuis.* To vernacular names *add* "*Jali*, Cachar;" and to numbers *add* "(E 1298. Cachar)."

„ 424, *C. Mastersianus.* As number *add* "(E 1299. Cachar)."

„ 424, *C. Jenkinsianus.* To vernacular names *add* "*Gallah*, Cachar;" and to numbers "(E 1300. Cachar.)"

„ 426, line 16 from the bottom. *For* "E 1354," *read* "E 1351, 1354,"

„ 427, line 24 from the bottom. *After* "Beng.;" *insert* "*Pepe siman*, Kol;" and *for* "E 1329" *read* "E 1328."

„ 428, line 12. *After* "Hind.;" *insert* "*Katanga*, Kól;"

„ 428, line 16 from the bottom. *After* "E 3428" *add* "E 1327;" and line 15, *for* "E1314" *read* "E1312"

„ 430, line 10. *After* "Beng.;" *insert* "*Mathan, saring, buru mat*, Kól; *Bukhar*, Palamow (the clump);"

„ 430, line 17. *After* "basket work." *add* "(B 1322, Burma. P 1352, Hoshiarpur, Punjab.)"

„ 430, line 12 from the bottom. *After* "E 1341" *add* "E 1466."

„ 431, line 28. *For* "CRYPTOGAMIÆ." *read* "CRYPTOGAMÆ."

„ 432, line 21. *For* "*Braineai nsignis*" *read* "*Brainea insignis*"

Under their proper places *add* E 3593, *Beilschmiedia Roxburghiana;* E 3597, *Ehretia Wallichiana;* E 3600, *Terminalia belerica;* E 3603, *Stereospermum chelonoides;* E 3607, *Quercus pachyphylla;* E 3609, *Quercus annulata;* E 3610, *Echinocarpus dasycarpus;* and E 3611, *Lagerströmia parviflora*,—all from Darjeeling.

MANUAL OF INDIAN TIMBERS.

I. DICOTYLEDONS.

Order I RANUNCULACEÆ.

A

velia,
30
is sai
Kumaun

1 CLEMATIS, Linn

Of this and the neighbouring genus, *Naravelia* 22 species occur in India They are distributed almost all over India 11 are found in the North West Himalaya 14 in the Eastern Himalaya and Khasia Hills, 2 in Central India, 4 in the Dekkan, 4 on the Western Coast and 10 in British Burma

Roy
C
with
is conspicuous for its woolly leaves and large soft tomentose bell shaped flowers In

K

per cubic foot for *C Vitalba*, Linn, the European Clematis, or Traveller s Joy

1 *C montana*, Ham., Hook Fl Ind i 2, Gamble 1. Vern *Ghantidli*, Hind
H 2851 Mahasu Simla 8 000 ft
2 *C barbellata*, Edgw , Hook Fl Ind i 3
H 2852 Mahasu Simla 8 000 ft
H 3156 Theog Simla 7 000 ft. 40 lbs.
3 *C grata*, Wall , Hook Fl Ind i 3 Vern *Ghantidli*, Hind
H 2850 Simla 6 000 ft
4 *C Buchananiana*, DC , Hook Fl Ind i 6, Kurz i 17, Gamble 1.
H 2838 Simla, 6 000 ft

Woody climbers, with a fibrous bark and a porous yellowish-white wood, with broad or very broad medullary rays and pores which vary from small to very large.

ORDER II. DILLENIACEÆ.

An order of three Indian genera, belonging to two tribes, *viz.*,—

Tribe I.—Delimeæ . . . . *Delima* and *Tetracera.*
„ II.—Dillenieæ . . . . *Dillenia* and *Wormia.*

Delima sarmentosa, Linn.; Hook. Fl. Ind. i. 31; Kurz i. 22; Gamble 2 (*Tetracera sarmentosa*, Roxb. Fl. Ind. ii. 645) Vern. *Monkyourik*, Lepcha, is an evergreen rough-leaved climber of Northern and Eastern Bengal, Burma and the Andamans. *Tetracera* includes two species: *T. lævis*, Vahl.; Hook. Fl. Ind. i. 31 (*T. trigyna*, Roxb. Fl. Ind. ii. 645), a climber of the forests of Malabar; and *T. Assa*, DC.; Hook. Fl. Ind. i. 31; Kurz i. 22, a scandent shrub of Chittagong. *Wormia* is found in Ceylon.

1. DILLENIA, Linn.

Eight species. *D. bracteata*, Wight; Hook. Fl. Ind. i. 37 (*D. repanda*, Roxb. Fl. Ind. ii. 652. *Wormia bracteata*, Beddome t. 115) is a handsome tree of South India. *D. pulcherrima*, Kurz i. 19; Hook. Fl. Ind. i. 37. Vern. *Byoo*, Burm., is a handsome deciduous tree of Pegu and Martaban, chiefly in the Eng forests, which Kurz evidently identifies with No. 2 of Brandis' Burma List of 1862 (*Bjooben*): weight 69 lbs., wood hard and strong, and used for rice-mills. *D. scabrella*, Roxb. Fl. Ind. ii. 653; Hook. Fl. Ind. ii. 38; Kurz i. 21. Vern. *Akachi*, Gáro, is a deciduous tree of Assam, Eastern Bengal and Chittagong. *D. parviflora*, Griff.; Hook. Fl. Ind. ii. 38; Kurz i. 21. Vern. *Lingyau*, Burm., is a deciduous tree of the mixed forests of Burma up to 2,000 feet.

Wood characterized by prominent medullary rays which appear as high, shining plates on a vertical section, giving the wood a remarkably mottled appearance. The rays are generally of two sizes and the pores are small, the distance between the rays being greater than the diameter of the pores.

1. D. indica, Linn.; Hook. Fl. Ind. i. 36; Brandis 1; Kurz i. 19; Gamble 1. *D. speciosa*, Thunb.; Roxb. Fl. Ind. ii. 650; Beddome t. 103. Vern. *Chalta*, Hind.; *Chalta, hargesa*, Beng.; *Phamsikol*, Lepcha; *Otengah*, Ass.; *Rai*, Uriya; *Uva*, Tam.; *Uva, pedda-kalinga*, Tel.; *Syalita*, Mal.; *Mota karmal*, Mar.; *Hondapara*, Cingh.; *Thapru, chauralesi*, Magh; *Thabyoo*, Burm.; *Carllow*, Taleing.

A large evergreen tree. Bark red, peeling off in small hard flakes. Wood red with white specks, close-grained, moderately hard. Pores moderate-sized, numerous, uniformly distributed. Medullary rays of two classes, broad and extremely fine, a large number of fine ones between two broad ones. Two or more lines of pores between each pair of broad rays. The medullary rays are visible on a radial section, giving the wood a mottled appearance, but not to the same extent as in *D. pentagyna*.

Bengal, Central and South India, Burma; often planted for ornament.
Growth moderate, our specimens shew seven rings per inch of radius. The weight and transverse strength have been determined by the following experiments:—

		Weight.	P
Skinner, No. 58, in 1862, in South India	. found	45 lbs.,	721
Kyd in 1831 with Assam wood, bars 2′×1″×1″	„	45 „	243 (doubtful)
Brandis, in 1862, Burma List, No. 3 . .	„	41 „	...
Smythies, in 1878, with our four specimens .	„	44·5 „	...

			lbs
E 596	Khookloong Forest Darjeel ng Terai		40
E 2310	S voke Forests Darjeeling Terai		41
E 1395	Chittagong		48
B 2501	Burma		49

2 D pentagyna, Roxb Fl Ind ii 602, Hook Fl Ind i 38, Beddome t 104, Brandis 2, Kurz i 21, Gamble 2 *D augusta*, Roxb l c Vern *Aggai*, Oudh, *Kallai*, C P, *Karkotta*, Beng, *Suha ruk*, Bori, C P *Tatri*, Nep, *Shukni*, Lepcha, *Akshi*, Ass, Mechi, *Akachi*, Garo *Rai*, Uriya, *Rai pinnai, nai tek*, Tam, *Rawadan chinnakalinga* Tel, *Kanagalu* Mal, *Mirchi*, Baigas *Kallei*, Gondi, *Male geru*, Kurg, *Machil*, Kan, *Zambrun* Magh, *Zimbyun* Burm

A deciduous tree Bark ½ inch thick, grey or pale brown, smooth inner substance red Wood rough, moderately hard, reddish grey, apt to split, warp and crack, strong heavy, durable, handsomely marked on a vertical section by the darker coloured medullary rays which appear as broad plates Pores small and moderate sized, many of them filled with a white substance, which is visible both on the horizontal and vertical sections, and is one of the characteristics of the wood Medullary rays numerous, moderately broad, with a few intermediate, very fine rays Annual rings marked by a narrow belt in the outer edge (autumn wood) without pores, this is particularly distinct in the wood from Oudh, less so in the specimens from Burma

of radius very large follow ng

experiments —

		Weight	P =
	found	70 lbs	907
		58	960
		45	593
		48	..
in 1864 with Burma wood (4 experiments)			
bars 3 × 1″ × 1		45	740
Smyth es in 1878 with our six spec mens		47 5	

is of plate found with sal

		lbs
O 348	Gorakl pur (1868)	54
E 638	Rakti Forest Da jeeling Terai	45
E 2311	Sivoke Darjeeling Terai	54
B { 302, 303 }	Burma (1867)	47
B 557	Prome Burma	38

3 D aurea, Smith, Hook Fl Ind i 37, Brandis 2, Kurz i 20 *D ornata*, Wall Vern , Burm

A large tree Bark beauti

ully mottled and wau all and

very small, often in short radial lines. Medullary rays broad, with a few intermediate very fine rays. Annual rings very indistinct. The wood differs from that of *D. indica* and *D. pentagyna* by smaller pores and narrower medullary rays.

Nepal, Bengal, Burma and Andaman Islands.

Weight: according to Benson, 44 lbs.; Brandis, 45 lbs.; our specimens give 48 to 49 lbs. Benson gives P = 834. Wood not used.

		lbs.
B 2502.	Burma (1862)	49
B 2253.	Andaman Islands (1866)	48

4. D. retusa, Thunb.; Thwaites Enum. 5; Hook. Fl. Ind. i. 37. Vern. *Godapara,* Cingh.

A tree. Wood resembling that of the other species.

Ceylon, up to 2,000 ft.

Weight according to A. Mendis, 51 lbs. per cubic foot. Wood used for building.

	lbs.
No. 29, Ceylon collection	51

Two specimens, B 2245 (52 lbs.) and B 2275 (44 lbs.), sent by Major Ford from the Andaman Islands in 1866 under name of *Lingyau,* have a structure similar to that of *D. aurea,* but the wood is purplish grey and may possibly belong to *D. pilosa,* Roxb. (Kurz i. 20) which, according to Kurz, is a large tree of the Andamans.

2. WORMIA, Rottb.

1. W. triquetra, Rottb.; Thwaites Enum. 4; Hook. Fl. Ind. i. 35. Vern. *Diyapara,* Cingh.

Wood reddish, in structure resembling that of *Dillenia.*

Ceylon, up to 2,000 ft.

Weight 44 lbs. per cubic foot. Wood used for building; the nut gives an oil.

	lbs.
No. 22, Ceylon collection	44

ORDER III. MAGNOLIACEÆ.

Contains 8 genera of Indian trees, shrubs or climbers, which are chiefly found in the Eastern Himalaya and the Eastern moist zone. The order is divided ino 4 tribes, *viz.,*—

Tribe I.—Trochodendreæ	*Euptelea.*
" II.—Wintereæ	*Illicium.*
" III.—Magnolieæ	*Talauma, Magnolia, Manglietia* and *Michelia.*
" IV.—Schizandreæ	*Schizandra* and *Kadsura.*

Four of these genera contain only shrubs or woody climbers: *Euptelea pleiosperma,* Hook. f. and Th.; Hook. Fl. Ind. i. 39, is a shrub of the higher Mishmi Hills; *Illicium* contains two shrubs; *I. Griffithii,* Hook. f. and Th. of the Khasia Hills, and *I. majus,* Hook. f. and Th.; Kurz i. 23, of the Thoungyeen Hills in Tenasserim; *Schizandra,* 4 climbing species of the Eastern Himalaya, of which *S. grandiflora,* Hook. f. and Th.; Hook. Fl. Ind. i. 44; Brandis 571; Gamble 3. Vern. *Klandru, kaljendru,* Simla; *Sillangti,* Kumaun; *Singhata, taksielrik,* Lepcha, with edible fruits, extends as far west as Simla (H. 3,029, Nagkanda, 9,000 ft., with a porous wood and strong resinous smell); and *Kadsura,* two climbers of Assam and Malabar respectively. Of the remaining genera, three are here described, the last, *Manglietia,* containing two large trees;

among such are *Liriodendron tulipiferum*, the well known Tulip Tree and several handsome Magnolias

Wood soft, generally rough Pores generally small, uniformly distributed Medullary rays sharply marked, fine The annual rings are generally marked by a clearly defined line, or narrow belt of soft texture The structure of the different species of this order is so uniform that no attempt has been made to give generic characters

1 TALAUMA, Juss

T Rabaniana Hook f and Th Hook Fl Ind i 40 Kurz i 24 Vern *Sappa* Ass is a large tree of the Khasia Hills and Burma whose wood is sometimes used in Assam for furniture and planking and *T mutabilis* Bl Hook Fl Ind i 40 (*T Candollei* Bl Kurz i 24) a shrub of Tenasserim and Tavoy Most of the species are remarkable for their large fragrant flowers

1 T Hodgsoni, Hook f and T , Hook Fl Ind i 40 , Gamble 3 Vern *Siffoo*, Lepcha , *Harre*, Nep

An evergreen tree Bark grey, ⅛ inch thick, smooth Wood grey, very soft, even grained Annual rings distinct Pores small Medullary rays fine and very fine

Sikkim Himalaya from the Terai up to 6 000 ft Khasia Hills
Growth moderate 7 rings per inch of radius Weight 21 lbs per cubic foot

	lbs
E 3100 Darjeeling 5 000 ft	21

2 MAGNOLIA, Linn

Besides the species given below *M globosa* Hook f and Th Hook Fl Ind i 41 Gamble 2 is a small tree of the inner ranges of the Sikkim Himalaya, *M Griffithii* Hook f and Th Hook Fl Ind i 41 an evergreen tree of the forests

41 Kurz i 21
mtari Ass *Duli*
of the base of the

1 M Campbellii, Hook f and Th , Hook Fl Ind i 41 , Gamble 2 Vern *Lal champ* Nep *Sigumgrip*, Lepcha , *Pendder*, Bhutia

A large, tall, deciduous tree Bark dark coloured, that of the branches black Wood white, very soft Annual rings distinctly marked by prominent white lines Pores small Medullary rays moderate-sized, prominent

Sikkim and Bhutan from 7 000 to 10 000 feet Growth moderate 11½ rings per inch of radius Weight 25 lbs per cubic foot Wood occasionally used for planking, but now scarce Chiefly remarkable for its magnificent large pink or white flowers, which appear in April

	lbs
E 365 Rangyrum Forest Darjeeling 7 500 feet	25

3 MICHELIA, Linn.

Besides the 5 species described below *M Kisopa* Ham Hook Fl Ind i 43

of Nepal A Aikin in
ood is yellowish i used
M punduana Hook

f. and Th.; Hook. Fl. Ind. i. 43, is found in the Khasia Hills; and *M. nilagirica* Zenk; Hook. Fl. Ind. i. 44; Beddome t. 62. Vern. *Pila champa*, Hind., Mar.; *Shembugha*, Tam.; *Walsapu*, Cingh., with a strong, fine-grained wood, used for building, beams and rafters, in the higher forests of the Western Ghâts and Ceylon.

1. M. Cathcartii, Hook. f. and Th.; Hook. Fl. Ind. i. 42; Gamble 2. Vern. *Kala champ*, Nep.; *Atokdúng*, Lepcha.

A large tree, with dark-coloured bark. Sapwood large, white, heartwood dark olive brown, moderately hard. Annual rings distinctly marked by a white line. Pores small. Medullary rays fine, not very prominent.

Sikkim Himalaya, 5,000 to 7,000 feet.

Weight 41 lbs. Wood used for planking, will do well for tea boxes. The flowers are terminal, white, but turn red in drying.

		lbs.
E 2314.	Rangbúl Forest, Darjeeling, 6,500 feet	41

2. M. Champaca, Linn.; Hook. Fl. Ind. i. 42; Roxb. Fl. Ind. ii. 656; Beddome vi; Brandis 3; Kurz i. 25; Gamble 3. Vern. *Champa*, Hind.; *Oulia champ*, Nep.; *Titasappa*, Ass.; *Champa, champaka*, Beng.; *Shimbu, sempangam*, Tam.; *Champakamu, sampenga, kanchanamu*, Tel.; *Sampighi*, Kan.; *Champakam*, Mal.; *Tsaga*, Burm.

A tall evergreen tree, with grey bark, ½ inch thick. Wood soft, seasons and polishes well; sapwood white; heartwood light olive brown; annual rings distinctly marked by a white line. Pores small and moderate-sized, equally distributed. Medullary rays short, fine to moderately broad, visible on a radial section.

Cultivated throughout India from the Ravi southwards and up to 5,400 feet in the North-West Himalaya. Wild in Nepal, Bengal, Assam (ascending to 3,000 feet), Burma, and in the forests of the Western Ghâts as far as Kanara.

Growth moderate, our specimens shew seven rings per inch of radius. It often reaches 8 feet girth at an age of 100 to 120 years.

Weight: the mean of 7 experiments made by Brandis in 1864 gave 37 lbs. per cubic foot; Puckle's experiments in Mysore gave 42 lbs.; while Smythies found 38 lbs. per cubic foot as the average of our specimens. In Brandis' experiments of 1864 on Nepal wood, 4 with bars 6′ × 2″ × 2″ gave P = 564, while 3 with bars 6′ × 2″ × 1½″ gave P = 561. Puckle's in Mysore with bars 2′ × 1″ × 1″ gave P = 642.

The wood is very durable: *e. g.*, specimen No. 1437 was cut by Griffith in 1836 and has been since then in Calcutta, and is now as sound as if fresh cut. The wood is used for furniture, house-building, carriage work and native drums. It is considered valuable in Northern Bengal for planking, door-panels and furniture; and in Assam for building and canoes. The flowers are prized on account of their sweet scent, and the tree is planted at Hindu shrines.

		lbs.
E 576.	Khookloong Forest, Darjeeling Terai	35
E 2313.	Sukna Forest, Darjeeling Terai	37
E 2195.	Nowgong, Assam	40
E 1049.	Eastern Dúars, Assam	36
E 1437.	Mishmi Hills (Griffith, 1836)	42

3. M. excelsa, Blume; Hook. Fl. Ind. i. 43; Gamble 3. Vern. *Bara champ, safed champ*, Nep.; *Sigugrip*, Lepcha; *Gók*, Bhutia.

A lofty deciduous tree. Bark greyish brown, ⅓ inch thick. Wood soft; sapwood small, white; heartwood olive brown, glossy; annual rings distinctly marked by firmer autumn wood with fewer pores. Pores small. Medullary rays short, fine and moderately broad, very numerous, prominent on a radial section. According to Gamble, the wood is yellow when fresh cut.

[illegible] 6,000 to 8,000 feet [illegible] Hills [illegible]

[illegible] cut

Used for building, but chiefly for planking, door and window frames, and for furniture The principal building and furniture wood of the Darjeeling Hills

		lbs
E 657.	Chuttockpur Forest, Darjeeling, 6,000 feet	33
E 2312	Rangbúl Forest, Darjeeling, 7,000 feet	33
E 1442	Mishmi Hills (Griffith, 1836)	34

4. **M. lanuginosa**, Wall.; Hook. Fl. Ind i. 43; Gamble 2. Vern. *Gogay champ*, Nep.

A large deciduous tree. Bark $\frac{1}{5}$ inch thick, greyish brown, smooth. Wood grey, soft, shining Pores small, scanty. Medullary rays fine and very fine, closely packed. Narrow concentric (annual?) rings of soft texture, often confluent.

Forests of Sikkim and the Khasia Hills from 5 000 to 7,000 feet
Growth moderate Weight 27 lbs per cubic foot

		lbs
E 3099	Darjeeling, 7,000 feet	27

5. **M. oblonga**, Wall.; Hook. Fl Ind. i. 43. Vern *Sappa, phulsappa*, Assam.

A tree Sapwood white; heartwood dark grey, soft Annual rings indistinct Pores moderate-sized, often in short radial lines Medullary rays fine, uniform, closely packed, equidistant, the distance between two rays less than the transverse diameter of the pores

Khasia Hills and Assam
Weight, 40 lbs per cubic foot The wood is used in Assam for canoes and rough furniture

		lbs
E 1268	Lakhimpur, Assam	40

ORDER IV. ANONACEÆ.

This order contains 21 Indian genera, the majority of which are South Indian and Burmese

They belong to 5 tribes, *viz*,—

Tribe	I—Uvarieæ	*Uvaria* and *Ellipeia*
„	II—Unoneæ	[illegible]
„	III—Mitrephoreæ	[illegible]
„	IV—Xylopieæ	[illegible]
„	V—Miliuseæ	*Miliusa, Saccopetalum, Alphonsea, Orophea* and *Bocagea*

[illegible] trees; five, *Uvaria, Ellipeia, Artabotrys* [illegible] climbing shrubs; fifteen, *Cyathocalyx, Cyc*[illegible]*ea, Popowia, Phæanthus, Goniothalamus* [illegible] *Orophea, Cananga, Alphonsea* and *Bocagea*, are shrubs or trees. In Northern and Central India the family is represented

by 4 species of *Polyalthia*, 3 of *Anona*, 2 of *Saccopetalum* and *Miliusa velutina.* The Eastern Himalaya, Assam and Eastern Bengal, contain trees, shrubs or climbers of the genera *Uvaria, Artabotrys, Anona, Polyalthia, Melodorum* and *Miliusa*, while the remaining genera, and the majority of the species of these, are found in South India or Burma.

Of the genera not herein described, the five climbing ones contain about 30 species, the principal of which are: *Uvaria macrophylla*, Roxb. Fl. Ind. ii. 663; Hook. Fl. Ind. ii. 49; Kurz i. 28. Vern. *Bagh-runga*, Beng.; *Thabwot-nway*, Burm., a large evergreen climber common in Eastern Bengal and Burma; *Ellipeia ferruginea*, Hook. f. and Th.; Hook. Fl Ind. i. 52 (*Uvaria ferruginea*, Ham.; Kurz i. 29), a shrub of the Irrawaddy valley; and *Artabotrys odoratissimus*, R. Br.; Hook. Fl. Ind. i. 54; Kurz i. 31 (*Uvaria odoratissima*, Roxb. Fl. Ind. ii. 666), a large Burmese shrub with fragrant flowers. *Cyathocalyx martabanicus*, Hook, f. and Th.; Hook. Fl. Ind. i. 53; Kurz i. 30, is an evergreen tree of Martaban and Tenasserim. *Cananga odorata*, Hook. f. and Th.; Hook. Fl. Ind. i. 56; Kurz. i. 33 (*Uvaria odorata*, Roxb. Fl. Ind. ii. 661) Vern. *Kadapgnam*, Burm., is a large evergreen tree of Tenasserim. *Unona* contains seven Burmese and three South Indian trees. *Popowia* two, *viz.*: *P. Beddomeana*, Hook. f. and Th.; Hook. Fl. Ind. i. 68 (*P. ramosissima*, Beddome viii.) of the Travancore and Tinnevelly hills; and *P. Helferi*, Hook. f. and Th.; Hook. Fl. Ind. i. 69; Kurz i. 39 of the Andamans and Tenasserim. *Alphonsea* four, *viz.*, *A. madraspatana*, Bedd. t. 92; *A. zeylanica*, Hook. f. and Th., of South India; *A. lutea*, Hook. f. and Th., of Eastern Bengal, South India and Burma; and *A. ventricosa*, Hook. f. and Th., of Assam, Chittagong and the Andamans, all trees of considerable size. *Mitrephora grandiflora*, Beddome t. 91.; Hook. Fl. Ind. i. 78, is a large handsome tree of the South Kanara forests. There are altogether, excluding those of the Malay Peninsula and Ceylon, about 100 Indian species; of these about 60 occur in Burma, 30 in South India and 30 in Eastern Bengal. Further specimens of the wood of the larger species are urgently required for investigation and determination of doubtful woods, such as *Bamau*, &c. (see p. 10).

Wood light-coloured, generally yellowish and soft. Pores small. Medullary rays fine to moderately broad, joined by numerous fine transverse bars. These transverse bars furnish an excellent character for distinguishing the wood of Anonaceæ from that of most other families; they are also found in *Bassia* and *Mimusops*, but in these genera they have more the character of wavy concentric lines. The structure of the different species of this family is so uniform that no attempt has been made to give generic characters.

1. POLYALTHIA, Blume.

Besides the two species here described, *P. simiarum*, Bth. and Hook. f.; Hook. Fl. Ind. i. 63; Kurz i. 37, is a large tree of Eastern Bengal and Burma; *P. Jenkinsii*, Bth. and Hook. f.; Hook. Fl. Ind. i. 64; Kurz i. 37, is a common tree of the Andamans, found also in Assam and Sylhet; *P. coffeoides*, Bth. and Hook. f.; Hook. Fl. Ind. i. 62; Beddome t. 53, is a common tree of the Western Ghâts, where its bark is made into ropes; *P. suberosa*, Bth. and Hook. f.; Hook. Fl. Ind. i. 65; Brandis 5. (*Uvaria suberosa*, Roxb. Fl. Ind. ii. 667.) Vern. *Bara chali*, Beng.; *Banderhola*, Ass.; *Chilka dúdúga*, Tel., is a small tree of Oudh, Bengal and South India, with a corky bark, and close, tough, hard, durable wood, weighing, according to Brandis 40, and Kyd 45 lbs. per cubic foot, and having P = 430. There are also about 8 other species described, from India and Burma.

1. P. longifolia, Benth. and Hook. f.; Hook. Fl. Ind. i. 62; Beddome t. 38; Brandis 4. *Uvaria longifolia*, Lam.; Roxb. Fl. Ind. ii. 664. Vern. *Asok, debdari*, Hind.; *Assothi*, Tam.; *Asoká, devadaru*, Tel.

A large evergreen tree with smooth bark. Wood white. Pores small, often subdivided, uniformly distributed. Medullary rays short, fine to very broad. Numerous, equidistant, very fine transverse bars across the rays.

[illegible] e tree throughout Bengal and South India [illegible] lbs Brandis says between 30 and 40, our [illegible] ents give P = 547

		lbs
E 2479	Calcutta .	37

2 P. cerasoides, Benth and Hook f, Hook Fl Ind i 63, Beddome t 1, Brandis 5, Kurz i 38 *Uvaria cerasoides*, Roxb Fl Ind ii 666 Vern *Hoom*, Mar, *Chilka dúdugu*, Tel, *Nakulsi, mulili*, Tam

A large evergreen tree Wood olive grey, moderately hard, close-grained Pores small Medullary rays short, broad and moderately fine, the distance between the rays twice or three times as great as the transverse diameter of the pores Numerous, very distinct, fine, equidistant, tranverse bars between the rays

Behar Eastern and Western Ghats D kkan Burma
Weight, 52 lbs per cubic foot The wood is used for carpentry and in boat building It is much prized in Bombay

		lbs
C 997	Poona	52

2 ANONA, Linn

Besides the species given below the 'Bullock s heart *A reticulata* Linn; Vern *Ramphal* and the 'Soursop *A muricata* L are also cultivated in many parts of India (Skinner No 14 gives for *A reticulata* W = 40 lbs P = 640)

1 A squamosa, Linn, Hook Fl Ind i 78, Roxb Fl Ind ii 657, Brandis 6, Kurz i 46, Gamble 3 The Custard Apple Vern *Sharifa, sitaphal*, Hind, *Ata, luna*, Beng, *Sita*, Tam, *Sitapundu*, Tel, *Atta*, Mal, Cingh, *Auza*, Burm

A small tree, with an erect, short trunk Bark thin, grey Wood soft, close grained Pores moderate sized, scanty Medullary rays moderate-sized, joined by numerous white transverse bars

Introduced from the West Indies and domesticated throughout India and Burma Cultivated for its fruit, which ripens from July to October Weight, 46 lbs per cubic foot

		lbs
B 2317	Myanoung Burma .	46

3 MILIUSA, Lesch.

Be[illegible] the two spe[illegible] [illegible] *[illegible] ightiana* Hook [illegible] Western Ghâts, [illegible] Martaban and [illegible] om Sikkim and the Khasia Hills

1 M velutina, Hook f and Th, Hook Fl Ind i. 87, Beddome t 37, Brandis 6, Kurz i 47 *Uvaria villosa*, Roxb Fl Ind ii 664 Vern *Dom-sal*, Hind, *Kari*, C P, *Kharrei*, Oudh, *Peddachilka dúduga, nalla dudúga*, Tel, *Thabutgyee*, Burm

A deciduous moderate sized tree, with a short erect trunk, in Burma a large tree Bark ½ inch thick, rough Wood yellow when fresh cut, grey or greyish brown when dry, moderately hard Annual rings indistinct Pores small, uniformly distributed, often in short radial lines Medullary rays fine and moderately broad, the distance between two rays larger than the transverse diameter of the pores Transverse bars distinct, numerous

Sub-Himalayan tract from Nepal to the Ganges, Central India, Godaveri districts and Burma.

Brandis says, "The seasoned wood weighs from 40 to 50 lbs. per cubic foot;" Kurz gives the weight at 42 lbs.; Benson's experiments give 60; and Skinner's (No. 93) 50 lbs. Benson's experiments give P = 833, and Skinner's P = 839.

Used for carts and agricultural implements, spear-shafts and oars.

		lbs.
B 3062.	Prome, Burma	...
B 3122.	Burma (1862)	48
O 3113.	Dehra Dún	53

2. M. Roxburghiana, Hook. f. and Th.; Hook. Fl. Ind. i. 87; Kurz. i. 47; Gamble 4. *Uvaria dioica,* Roxb. Fl. Ind. ii. 659. Vern. *Sungden,* Lepcha; *Tusbi,* Sylhet.

A small tree. Bark thin, grey. Wood greyish white, hard. Pores very small, scanty. Medullary rays short, white, of all sizes, from fine to broad, very numerous, prominent on a radial section. Numerous white parallel wavy transverse bands across the rays.

Terai and valleys of the Bengal Himalaya, Khasia Hills, Chittagong and Burma. Weight 51 lbs.

		lbs.
E 2316.	Chunbati, Darjeeling, 2,000 feet	51

4. SACCOPETALUM, Bennett.

Besides the species here described, *S. longiflorum,* Hook. f. and Th., is a tree of Eastern Bengal found near Purneah.

1. S. tomentosum, Hook. f. and Th.; Hook. Fl. Ind. i. 88.; Beddome t. 39; Brandis, 7. *Uvaria tomentosa,* Roxb. Fl. Ind. ii. 667. Vern. *Kirna, karri,* Hind.; *Hoom,* Bombay; *Chilkadúdú,* Tel.; *Thoska,* Gondi; *Humba,* Kurku.

A large tree with straight stem. Bark ⅓ inch thick, of various shades, sometimes black, deeply cracked. Wood olive brown, moderately hard, smooth, close-grained; no heartwood. No annual rings. Pores small and moderate-sized, numerous. Medullary rays broad and fine, very numerous, distinctly visible on a radial section as long, narrow plates, giving the wood a mottled appearance. Numerous, regular, fine, white, transverse bars across the medullary rays, the distance between the rays being a little larger than the transverse diameter of the pores.

Oudh, Nepal Terai, Gorakhpur, Behar, Central India, Western Gháts. Weight, 45 lbs. per cubic foot.

		lbs.
O 342.	Gorakhpur (1868)	...
C 1109.	Ahiri Reserve, Central Provinces	45

The following woods cannot at present be identified, but they probably belong to this family:—

B 1949. (58 lbs.) *Bokenet* from Tavoy. A hard, close-grained, yellow wood; when seasoned it is said to shew black and white stripes, and is then called Zebra Wood. Pores small, scanty. Medullary rays fine and very fine, joined by numerous fine parallel transverse bars. Used for furniture. Scarce in the Mergui Archipelago but plentiful in the Andaman Islands.

B 2281. (32 lbs.) Received from the Andaman Islands in 1866 under the name of *Thanloong.* Pores small, often subdivided. Medullary rays moderately broad, the distance between them many times larger than the transverse diameter of the pores. Numerous faint transverse bars. It may possibly be *Polyalthia Jenkinsii,* Bth. and Hook. f.

B 2251 (33 lbs) Received from the Andamans in 1866 under the name of *Thitpyoo*, has a white soft wood, with small, scanty pores often in short radial lines The [illegible]

Anonaceæ
B 2236 (53 lbs) Received from the Andamans in 1866 under the name of *Pan noo*, has a similar structure to *Bamau* Wood yellowish grey, hard Pores small, transverse diameter equal to or one half the distance between the medullary rays, which are fine and are joined by numerous transverse bars

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ORDER V. MENISPERMACEÆ.

An order which, in India with the single exception of the species described below, contains only climbing plants Of the 17 genera found in India, many contain only single species These 17 genera belong to 4 tribes, *viz*,—

Tribe I —Tinosporeæ	[illegible]
„ II —Cocculeæ	[illegible] *campylus*
„ III —Cissampelideæ	*Stephania, Cissampelos, Cyclea, Lophopetalum*
„ IV —Pachygoneæ	*Pachygone, Pycnarrhena, Hæmatocarpus Antitaxis*

Anamirta Cocculus, W and A, Hook Fl Ind i 99, Brandis 8, Kurz i 53 [illegible]

[illegible] Harjeuri, Oudh, Batulpati, Nep, Pata, Tel, a climber common both to the old and new worlds, furnishes the Radix Pareiræ of druggists *Coccculus Leæba*, DC, Hook, Fl Ind i 102 [illegible]
Hook [illegible]
814) [illegible]
racemo [illegible]
carpon [illegible]

"The structure of the wood of Menispermaceæ is remarkable, and differs in several respects from the wood of other Dicotyledons The vascular bundles of a young branch (which in most Dicotyledons unite and form concentric rings of wood and liber) generally remain distinct in Menispermaceæ, and are separated by broad radial masses of cellular tissue, corresponding to the medullary rays of ordinary wood. After some time these original wood fascicles cease growing, and in the cortical cellular tissue exterior to the liber originates a second circle of bundles similar to the first formed, excepting in the absence of spiral vessels.

Sub-Himalayan tract from Nepal to the Ganges, Central India, Godaveri districts and Burma.

Brandis says, "The seasoned wood weighs from 40 to 50 lbs. per cubic foot;" Kurz gives the weight at 42 lbs.; Benson's experiments give 60; and Skinner's (No. 93) 50 lbs. Benson's experiments give P = 833, and Skinner's P = 839.

Used for carts and agricultural implements, spear-shafts and oars.

		lbs.
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O 3113.	Dehra Dún	53

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A small tree. Bark thin, grey. Wood greyish white, hard. Pores very small, scanty. Medullary rays short, white, of all sizes, from fine to broad, very numerous, prominent on a radial section. Numerous white parallel wavy transverse bands across the rays.

Terai and valleys of the Bengal Himalaya, Khasia Hills, Chittagong and Burma. Weight 51 lbs.

		lbs.
E 2316.	Chunbati, Darjeeling, 2,000 feet	51

4. SACCOPETALUM, Bennett.

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A large tree with straight stem. Bark ⅓ inch thick, of various shades, sometimes black, deeply cracked. Wood olive brown, moderately hard, smooth, close-grained; no heartwood. No annual rings. Pores small and moderate-sized, numerous. Medullary rays broad and fine, very numerous, distinctly visible on a radial section as long, narrow plates, giving the wood a mottled appearance. Numerous, regular, fine, white, transverse bars across the medullary rays, the distance between the rays being a little larger than the transverse diameter of the pores.

Oudh, Nepal Terai, Gorakhpur, Behar, Central India, Western Gháts. Weight, 45 lbs. per cubic foot.

		lbs.
O 342.	Gorakhpur (1868)	...
C 1109.	Ahiri Reserve, Central Provinces	45

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B 2281. (32 lbs.) Received from the Andaman Islands in 1866 under the name of *Thanloong.* Pores small, often subdivided. Medullary rays moderately broad, the distance between them many times larger than the transverse diameter of the pores. Numerous faint transverse bars. It may possibly be *Polyalthia Jenkinsii,* Bth. and Hook. f.

B 2251 (33 lbs) Received from the Andamans in 1866 under the name of *Thitpyoo*, has a white soft wood with small, scanty pores often in short radial lines The medullary rays are moderately broad, far apart, joined by innumerable parallel bars, and shew well on a radial section

B 273 (38 lbs) Received from Burma in 1867 under the name *Bamau*, has an olive grey wood, it is handsome, even grained moderately hard and possesses a certain lustre Pores small often subdivided Medullary rays fine Numerous faint white transverse bars across the medullary rays According to Kurz, *Bamau* is *Tetranthera grandis*, but on account of the transverse bars in the wood we have placed it under Anonaceæ

B 2236 (53 lbs) Received from the Andamans in 1866 under the name of *Pan noo*; has a similar structure to *Bamau* Wood yellowish grey hard Pores small, transverse diameter equal to or one half the distance between the medullary rays, which are fine and are joined by numerous transverse bars

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ORDER V MENISPERMACEÆ.

An order which in India with the single exception of the species described below, contains only climbing plants Of the 17 genera found in India, many contain only single species These 17 genera belong to 4 tribes *viz*,—

Tribe I —Tinosporeæ	*Aspidocarya Parabæna Tinospora, Fibraurea Anamirta*
„ II —Cocculeæ . .	*Tiliacora Limacia, Cocculus, Pericampylus*
, III —Cissampelideæ .	*Stephania Cissampelos, Cyclea, Lophopetalum*
„ IV —Pachygoneæ .	*Pachygone Pycnarrhena Hæmatocarpus Antitaxis*

Anamirta Cocculus, W and A, Hook Fl Ind i 99, Brandis 8, Kurz i 53 (*Menisperm* [illegible] Roxb Fl Ind [illegible] 807) Vern *Kalmar* [illegible] reira, [illegible] Ind [illegible] P, [illegible] e old and new worlds, furnishes the Radix Pareira of druggists *Cocculus Leæba* DC, Hook Fl Ind i 102 Brandis 9 Vern *Vallur illar*, Pb, and *C villosus* DC, Hook Fl Ind i 101, Brandis 9 (*Menispermum hirsutum* Linn, Roxb Fl Ind iii 814) Vern *Hier, dier* are large climbers of the dry and arid zones, while *Tiliacora racemosa* Coleb, Hook Fl Ind i 99, Brandis 10, Kurz i 54 (*Menispermum polycarpon* [illegible] 816 [illegible] *Tiga* [illegible] with [illegible] and *Faravana*, Tirm [illegible]

"The structure of the wood of Menispermaceæ is remarkable, and differs in several respects from the wood of other Dicotyledons The vascular bundles of a young branch (which in most Dicotyledons unite and form concentric rings of wood and liber) generally remain distinct in Menispermaceæ, and are separated by broad radial masses of cellular tissue, corresponding to the medullary rays of ordinary wood After some time these original wood fascicles cease growing, and in the cortical cellular tissue exterior to the liber originates a second circle of bundles similar to the first formed, excepting in the absence of spiral vessels

After these bundles have attained full development, they in turn cease to grow, and a third circle forms in the cellular tissue of the bark, and so on. There is great variety in the wood structure of the genera of this family."—*Brandis' Forest Flora*, p. 10.

1. COCCULUS, DC.

1. C. laurifolius, DC.; Hook. Fl. Ind. i. 101; Brandis 9. *Menispermum laurifolium*, Roxb. Fl. Ind. iii. 815. Vern. *Tilpara, kakra*, Hind.

A moderate-sized evergreen tree. Bark thin, grey. Wood greyish white, soft, divided by very broad medullary rays and concentric rings of the same substance as the rays, into numerous oblong radial masses, each mass consisting of wood cells and small uniformly distributed pores with a narrow belt of fibres (liber) at the outer edge.

Outer Himalaya from the Ravi to Nepal ascending to 5,000 ft.
Weight 41 lbs. per cubic foot.

		lbs.
H 2939.	Near Suni, Sutlej Valley, 3,000 ft.	42
E 2466.	Calcutta Botanic Gardens	40

ORDER VI. BERBERIDEÆ.

An order containing four Indian genera of woody plants, belonging to two tribes, *viz.*:
Tribe I.—Lardizabaleæ . . . . *Decaisnea, Parvatia* and *Hollböllia*.
„ II.—Berbereæ . . . . *Berberis*.

Two, each containing one species, are climbers, *viz.*, *Parvatia Brunoniana*, Decaisne; Hook. Fl. Ind. i. 108, from Assam and the Khasia Hills; and *Hollböllia latifolia* Wall.; Hook. Fl. Ind. i. 108; Brandis 13; Gamble 4. Vern. *Gophla*, Kumaun; *Chiriyanangri, bagul*, Nep.; *Pronchadik*, Lepcha; *Domhyem*, Bhutia. The latter is found in the Himalaya from Kumaun eastwards, above 4,000 feet elevation, and in the Khasia Hills. It has a large edible fruit, a soft corky bark and wood with large pores and broad medullary rays (E 2859. Tukdah, Darjeeling, 5,000 feet). *Decaisnea insignis*, Hook. f. and Th.; Hook. Fl. Ind. i. 107. Vern. *Nomorchi*, Lepcha; *Loodooma*, Bhutia, is an erect shrub of the Inner Sikkim Himalaya, growing between 7,000 and 10,000 feet, also with edible fruit.

1. BERBERIS, Linn.

Contains about twelve species, all Himalayan; two only extending southwards to the Nilgiris and the hills of Burma. One species, *B. asiatica*, Roxb. Fl. Ind. ii. 182; Hook. Fl. Ind. i. 110. Vern. *Kilmora*, Kumaun; *Mate-kissi, chitra*, Nep., is also found on Parasnáth in Behar. Besides those here described, *B. umbellata*, Wall., *B. asiatica*, Roxb., *B. Wallichiana*, DC., *B. insignis*, Hook. f., *B. macrosepala*, Hook. f., and *B. concinna*, Hook. f. occur in different parts of the Himalaya, chiefly at elevations above 8,000 ft.

Wood yellow, hard or moderately hard, splits very much in seasoning. Pores small, larger and more numerous on the inner edge of each annual ring, the rest of the pores smaller and arranged in irregular tails or patches. Medullary rays bright yellow, moderately broad, or broad.

The chief North-West Himalayan species may thus be recognized:—
Leaves pinnate . . . . *B. nepalensis*.
Leaves simple—
  Leaves thin with many equal serratures . . . . *B. vulgaris*.
  Leaves coriaceous, serratures few, unequal
    Branches grey
      Leaves large, green beneath . . . . *B. coriacea*.
      Leaves small, glaucous beneath . . . *B. Lycium*.
    Branches reddish . . . . *B. aristata*.

1 **B nepalensis,** Spreng , Hook Fl Ind i 109, Beddome xi , Brandis 12, Kurz i 58, Gamble 5 *B pinnata,* Roxb Fl Ind ii 184 (probably) Vern *Amudanda, chiror,* Pb , *Chatri, milkisse, jamnemunda,* Nep

An evergreen shrub attaining in Bengal a height of 20 feet and occasionally 2 feet in girth Bark soft, corky Wood bright yellow, hard. Pores very small, arranged in radial lines or patches Medullary rays moderately broad, prominent, numerous, well marked on a radial section

[illegible]

		lbs
E 2318	Darjeeling 7 000 ft	49

2 **B vulgaris,** Linn , Hook Fl Ind i 109, Brandis 11 The Barberry Vern *Zirishk, kashmal, chochar,* Pb

A deciduous thorny shrub, with soft brown bark, $\frac{1}{6}$ inch thick Wood lemon yellow, moderately hard, even grained Annual rings marked by an irregular belt of small pores which are larger than those in the rest of the wood The pores in the main portion of the annual rings are grouped in short whitish, irregularly bent lines or tails Medullary rays fine to moderately broad, well marked on a vertical section

Himalaya from Nepal westwards in shady forests above 8 000 ft elevation Afghanistan and Beloochistan Europe

Weight our specimen gives 52 lbs per cubic foot Mathieu Fl For p 12 gives 45 to 57 lbs Fruit edible The wood is a good firewood

		lbs
H 3037	Mat yana Simla 9 000 ft	
H 3040	Naghanda Simla 9 000 ft	55

3 **B aristata,** DC , Hook Fl Ind i 110, Beddome xii , Brandis 12 Gamble 5 *B angustifolia,* Roxb Fl Ind ii 183 Vern *Simlu simlu, kasmal, chitra,* Pb , *Tsema,* Bhutia, *Chitra,* Nep , *Chotra,* Hind

An erect spinous shrub Bark soft, light brown, corky Wood yellow, hard Annual rings distinctly marked by a narrow belt of numerous pores Pores small, in short, narrow, wavy tails of white tissue Medullary rays moderately broad

Outer Himalaya from the Sutlej to Bhutan in the North West Himalaya 6 000 ft to 10 000 ft in Darjeeling above 10 000 ft Western Ghats at high elevations Ceylon Wood used for fuel the root in native medicine

		lbs
H 80	Simla 7 000 ft	52
H 2888	Nagkanda Simla 8 000 ft	
H 3053	Mahasu Simla 8 000 ft	

4 **B Lycium,** Royle, Hook Fl Ind i 110, Brandis 12 Vern *Kasmal,* Simla, *Kashmal, chotra,* Hind

An erect rigid shrub Bark rough, corky, white or light grey Wood yellow, moderately hard Annual rings marked by a narrow porous belt Pores very small and extremely small, in narrow irregular lines of white tissue Medullary rays moderately broad, numerous

North-West Himalaya from 3,000 to 9,000 ft.

		lbs.
H 45.	Simla, 6,500 ft.	...
H 3051.	Mahasu, Simla, 7,500 ft.	52

5. **B. coriacea**, nov. sp., Brandis. Vern. *Kashmal*, Simla.

A large erect thorny shrub, with soft corky bark. Wood yellow, moderately hard. Annual rings marked by a belt of small or moderately sized pores; in the rest of the wood the pores are very small or extremely small, and arranged in numerous confluent, irregularly shaped tails and patches of whitish tissue. Medullary rays short, fine to broad.

North-West Himalaya above 8,000 ft.; often forming alone or with other shrubs large extents of scrub jungle, *e. g.*, in the valley south of Nagkanda near Simla.

		lbs.
H 48.	Nagkanda, Simla, 9,000 ft.	...
H 2894.	" " "	...
H 3039.	" " "	...
H 3041.	" " "	55
H 3043.	" " "	52
H 3038.	Matiyana, Simla, 8,000 ft.	...
H 3042.	Hattu, Simla, 10,000 ft.	...

6. **B. angulosa**, Wall.; Hook. Fl. Ind. i. 111; Gamble 5. Vern. *Chutra*, Nep.

A large erect shrub. Bark soft, brown, corky. Wood dark grey or yellowish brown, hard. Annual rings marked by a belt of small pores; in the rest of the wood the pores are very small, arranged in irregular radial tails of whitish tissue. Medullary rays fine, numerous.

Inner ranges of Nepal and Sikkim above 11,000 ft.

E 2862. Suburkum, Darjeeling, 11,000 ft.

ORDER VII. CAPPARIDEÆ.

Six Indian genera are of trees, shrubs or climbers belonging all to one tribe, Cappareæ. The climbing genera are: *Mærua*, one species, *M. arenaria*, Hook. f. and Th.; Hook. Fl. Ind. i. 171 (*Capparis heteroclita*, Roxb. Fl. Ind. ii. 570). Vern. *Patta tiga*, Tel., a large woody climber of the Western Himalaya, Upper Gangetic plain and Central India; and *Roydsia*, two species, *R. suaveolens*, Roxb. Fl. Ind. ii. 643; Hook. Fl. Ind. i. 180; Gamble 5. Vern. *Kasonli*, Nep.; *Tunggor*, Lepcha, in the tropical forests of Sikkim, Bhutan and the Khasia Hills, and *R. obtusifolia*, Hook. f. and Th.; Kurz i. 67. Vern. *Ngaphyoo*, Burm., in the swamp forests of Burma. *Niebuhria linearis*, DC.; Hook. Fl. Ind. i. 171, is a small tree of the hilly parts of the Carnatic; and the species of *Cadaba* are small straggling shrubs chiefly of the arid zone, *C. indica*, Lamk. Vern. *Kali taka*, occurring in Berar and the Dekkan, and *C. heterotricha*, Stocks; Hook. Fl. Ind. ii. 173, being a small tree found in rocks near Cape Monze in Sind.

Wood light-coloured. Pores small to moderate-sized, rarely large; often arranged in radial lines; medullary rays moderately broad, wavy.

1. CAPPARIS, Linn.

A genus of about thirty species of thorny shrubs or climbers. About fifteen occur in Burma, ten in the Dekkan and Carnatic, five on the western coast, eight in Bengal and Assam, two in the Gangetic valley and Central India, and three in the arid zone of the Punjab and Sind. Besides those here described, there are several common species. *C. spinosa*, Linn.; Hook. Fl. Ind. i. 173; Brandis 14. Vern. *Kabawa*, Afg.; *Kábra*, Tibet; *Kaur, keri, kander, kakri, taker, ber, barari, bauri, bassar*, Pb.; *Ulta-kanta*, Kumaun;

Kalvári, Sind, is a small trailing shrub of the Punjab and Sind whose flower buds give the capers of commerce, they are pickled and eaten in Sind and the Punjab Salt Range *C divaricata*, Lamk, Hook Fl Ind i 17 (*C stylosa*, DC, Beddome xiii) Vern *Toaratti*, Tam, *Budareni* Tel, *Pachunda*, Mar is a shrub or small tree of the Dekkan and Carnatic with large scarlet fruit *C olacifolia* Hook f and Th, Hook Fl Ind i 178, Gamble 5 Vern *Nashi hais* Nep, *Jhenok*, Lepcha, is a common thorny shrub of river banks and valleys in Northern Bengal and Assam *C horrida*, Linn, Hook Fl Ind i 178, Brandis 15 (*C zeylanica*, Roxb Fl Ind ii 567) Vern *His karila*, Pb, *Karralura*, Oudh, *Adonda*, Tel, *Katerni*, Gondi, *Gitoran*, Ajmere, *Atanday*, Tam is a climbing shrub common in most parts of India

1. C grandis, Linn f, Hook Fl Ind i 176, Beddome xiii, *C. bisperma*, Roxb Fl. Ind ii 569 Vern *Guli*, *regguti*, *ragota*, Tel

A small tree Bark thick, extremely irregular, rough and corky, deeply and irregularly cracked Wood white, moderately hard No heartwood, no annual rings Pores scanty, moderate-sized to large Medullary rays moderately broad, short

Chanda district and eastern part of the Dekkan Eastern Ghats and Carnatic Weight, 46 lbs Wood durable much used by the natives in the Madras Presidency

		lbs
C 1134	Ahiri Central Provinces	46

2. C. aphylla, Roth, Hook Fl Ind i 174, Beddome xiii, Brandis 14 Vern *Karil*, Pb, *Kiral*, Sind, *Kari*, Behar

A small tree with scanty, small, caducous leaves, found only on the young shoots Bark ½ inch thick, grey, corky, with deep irregular cracks. Wood light yellow, turning brown on exposure, shining very hard and close grained Annual rings doubtful Pores small, generally in groups or patches between the prominent, very short, numerous, fine medullary rays

Punjab, Sind, Rajputana and the Dekkan

Weight 53 lbs per cubic foot The wood is used for small beams and rafters in roofs, for the knees of boats, for oilmills and agricultural implements, it is a good firewood, and is not eaten by white ants The fruit is eaten both raw and preserved, and the young flower buds are preserved as pickle

		lbs
P 444	Ajmere	.
P 892	Multan	53
P 941	„	
P 3056	„	

2 CRATÆVA, Linn

1. C. religiosa, Forst, Hook Fl Ind i 172, Beddome t 116 and xiv (*C Nurvala*, Ham), Brandis 16, Gamble 5 *C Roxburghii*, Ham, Kurz i 66 *Capparis trifoliata*, Roxb Fl Ind ii 571 Vern *Brarna*, *bilasi*, *bila*, *biliana*, Hind, *Barun*, *tikto shak*, Beng, *Purbong*, Lepcha, *Maralingam*, *marvilinga*, Tam, *Uskia*, *usiki*, *ulimidi*, *urumatti*, *tellavoolemara*, Tel, *Nirvala*, Kan, Mal, *Kúmla*, *karwan*, Mar, *Kadet*, *katat*, Burm

A moderate-sized deciduous tree Bark grey, ½ inch thick, with long horizontal wrinkles Wood yellowish white, when old turning light [illegible] sized, numerous [illegible] pore surrounded [illegible], fine and moderately broad, the distance between the rays slightly greater than the transverse diameter of the pores

Sub-Himalayan tract from the Ravi eastwards, Bengal, Assam, Central and South India and Burma.

Weight, 42 lbs. The wood is used for drums, models, writing-boards, combs and in turnery.

		lbs.
P 3217.	Nagpahar, Ajmere	...
O 270.	Garhwal (1868)	33
O 3112.	Dehra Dún	47
C 3115.	Chanda, Central Provinces	45
B 565.	Prome, Burma	43
No. 23.	Salem Collection	44

ORDER VIII. VIOLACEÆ.

This order contains three genera of Indian plants: of these, two, *viz.*, *Viola* and *Ionidium*, are herbaceous; while the third, *Alsodeia*, comprises six shrubs or small trees found in Northern and Eastern Bengal, Burma and Malabar. *A. bengalensis*, Wall.; Hook. Fl. Ind. i. 186; Kurz i. 70; Gamble 6. Vern. *Kalipat*, Nep., occurs in Sikkim, Assam, Burma and the Andamans. *A. Roxburghii*, Wall.; Hook. Fl. Ind. i. 186; Kurz i. 69 (*Vareca heteroclita*, Roxb. Fl. Ind. i. 648), in Sylhet and the Andamans; and *A. racemosa*, Hook. f. and Th.; Hook. Fl. Ind. i. 187 (*A. longiracemosa*, Kurz i. 70), in Assam and Tenasserim, said by Kurz to have a yellowish white close-grained wood.

No. B 3198. (Home, 1874, No. 26, *Kyadoo*). A white scented wood from the Andamans, with scanty, moderately large pores; moderately fine, wavy, medullary rays, and numerous concentric lines of soft tissue, was identified by Kurz from Home's specimens as coming nearest to *Alsodeia* (Brandis' Memorandum on the Forest Resources of the Andamans, dated August 25th, 1874).

ORDER IX. BIXINEÆ.

Seven genera belonging to three tribes:—

Tribe I.—Bixeæ	*Cochlospermum* and *Bixa*.
„ II.—Flacourtieæ	*Scolopia*, *Flacourtia* and *Xylosma*.
„ III.—Pangieæ	*Gynocardia* and *Hydnocarpus*.

Bixa Orellana, Linn.; Roxb. Fl. Ind. ii. 581; Hook. Fl. Ind. i. 190; Beddome t. 79; Brandis 17; Kurz i. 72; Gamble 6. The Arnotto Plant. Vern. *Latkan*, Hind., Beng.; *Jarat*, Ass.; *Jafra*, Tel.; *Kuragúmangjal*, Tam.; *Kuppa-manhala*, Kan.; *Kisri*, Mar.; *Theedin*, Burm., is an American shrub, introduced and cultivated in India for the red dye given by the pulp surrounding the seeds.

Hydnocarpus contains four Indian species. *H. heterophylla*, Bl.; Kurz i. 77. Vern. *Kal-lau-tso*, Burm., is described by Kurz as an evergreen tree with heavy, strong, yellowish white wood, found in the tropical forests of Burma. *H. castanea*, Hook. f. and Th.; Hook. Fl. Ind. i. 197; Kurz i. 79, is a tree of the Andaman Islands. *H. alpina*, Wight; Hook. Fl. Ind. i. 197; Beddome t. 77. Vern. *Maratatti*, Nilgiris, is a tree of the Western Ghâts, whose wood is said by Beddome to be used in the construction of native houses, for packing cases and firewood. *H. Wightiana*, Bl.; Hook. Fl. Ind. i. 196 (*H. Wightiana* and *H. inebrians*, Vahl.; Beddome xvi, xvii). Vern. *Yetti, maravetti*, Tam.; *Kowti*, Mar.; *Makúlú*, Cingh., is a common tree of the Western Ghâts and western coast.

The wood of *Flacourtia*, *Xylosma*, *Gynocardia* and *Scolopia* is uniform and remarkably similar to the wood of Euphorbiaceæ; it is hard and close-grained and the pores are small, in short radial lines between fine or very fine, closely packed medullary rays. The wood of *Cochlospermum* has an entirely different structure.

1. COCHLOSPERMUM, Kuntto.

1. C. Gossypium, DC.; Hook. Fl. Ind. i. 190; Beddome xiv;

Brandis 17, Kurz i 72 *Bombax*
Vern. *Kúmbi, gabdi, ganiár, galgal,*
Gungú, kong, kandu gogu, Tel , *Tanak*
Mal , *Ganeri,* Bhíl , *Ganeri, gunglay,* Mar.

A small deciduous tree, with short, thick, spreading branches Bark one inch thick, deeply furrowed , inner substance red Wood extremely soft, grey , no heartwood Pores large, scanty, often subdivided into compartments. Medullary rays broad, on a radial section, visible as long rough plates

Forests at the base of the North West Himalaya, from the Sutlej eastwards,

e gum (*Katira*),

		lbs
C 1141	Ahiri Reserve, C P	17

2. SCOLOPIA, Schreber

Three species *S crenata* Clos , Hook Fl Ind i 191 , Beddome t 78 (*Phoberos crenatus,* W and A Prodr 29) Vern *Hitterlu* Burghers is a tree of Malabar, Kanara and Mysore, said by Beddome to have a hard dense, white wood, liable to warp *S Roxburghii,* Clos , Hook Fl Ind i 190, Kurz i 73 (*Ludia spinosa,* Roxb Fl Ind ii 507), is an evergreen tree of Tenasserim the stem and older branches of which are armed with long straight or compound spines

1. **S. rhinanthera,** Clos , Hook Fl Ind i 190 B 1969, collected by Kurz in the Andamans in 1866, bears this name. It has a hard red wood, with a structure similar to that of *Flacourtia,* the pores being small, in short radial lines, between the very fine and closely packed medullary rays Weight 60 lbs per cubic foot.

3 FLACOURTIA, Commerson

Seven Indian species The following are the names given in the Flora Indica i , 191 to 194 —

1. *F sumatrana* Planch , Kurz i 74	Tenasserim
2 *F inermis* Roxb Fl Ind iii 833, Beddome xvi Kurz i 74 Vern *Tomitomi* Mal , *Ubbolu,* Kan Perhaps introduced Fruit edible	Sylhet, S India, Martaban
3 *F montana,* Grah , Beddome xvi Vern *Attak,* Kan Mar	Western Coast
4 *F mollis,* Hook f and Th , Kurz i 74	Tenasserim
5 *F Cataphracta* Roxb Fl Ind iii 834, Beddome xvi , Kurz i 74 Vern *Paniala, panizali* Beng , *Talispatri, paniala,* Hind , *Talisapatri,* Tam , Tel , *Na yuwai,* Burm	Bengal, Burma, Bombay, Western Ghats
6. *F Ramontchi,* L'Herit . .	India.
7 *F sepiaria,* Roxb Fl Ind iii 835 (also *F obcordata*), Beddome xvi , Brandis 18, Kurz i 75 (also *F rotundifolia*) Vern *Sharawani, dajkar, jidkar,* Hind , *Kanru,* Tel.	Kumaun, Bengal and South India

1 **F Ramontchi,** L'Herit , Hook Fl Ind i 193 , Beddome xvi , Brandis 18 *F. sapida,* Roxb Fl Ind iii 835 , Kurz i 75. Vern. *Kukai, kakoa, kangú, kandei,* Pb , *Bilangra, bhanber, kanju, kandi*

kattár, katti, Hind.; *Kaikun*, Mhairwarra; *Kánk, kánki, biláti*, C. P.; *Arma-suri, katien*, Gondi; *Gurgoti*, Kurku; *Bincha, katái*, Beng.; *Boincha*, Uriya; *Pahar, bhekal, kakei, kaker*, Mar.; *Bhutankas*, Hyderabad; *Kanregu, pedda-kanru, kaka, nakka-naregu*, Tel.; *Úgúrassa*, Cingh.; *Na-yuwai*, Burm.

A small thorny deciduous tree. Bark grey. Wood red, hard, close- and even-grained, splits, but does not warp and is durable. Pores small, in radial lines between the fine, uniform, closely-packed and somewhat wavy medullary rays.

Dry hills throughout India, Prome District in Burma.
Weight: Brandis gives 50 lbs. per cubic foot, the average of our specimens is 53 lbs. The wood is used for turning and agricultural implements, and the fruit and leaves are eaten.

		lbs.
P 460.	Ajmere	52
P 3221.	Nagpahar, Ajmere	...
O 260.	Garhwal (1868)	50
C 2739.	Moharli Reserve, C. P.	52
B 3125.	Burma (1862)	59

4. XYLOSMA, Forster.

Three species. *X. controversum*, Clos.; Hook. Fl. Ind. i. 194, is a tree of Nepal and the Khasia Hills, nearly allied to *X. longifolium*. *X. latifolium*, Hook. f. and Th.; Hook. Fl. Ind. i. 194, is a large thorny tree of the Bababuden Hills in Mysore.

1. X. longifolium, Clos.; Hook. Fl. Ind. i. 194; Brandis 19. Vern. *Chopra, chirúnda, chirndi, drendu*, Pb.; *Kattáwa*, Oudh; *Dandál, katári, kandhára*, Hind.

A small evergreen tree. Bark $\frac{1}{6}$ inch thick, grey. Wood pinkish, moderately hard, even-grained. Pores small, in short radial lines between the wavy, very fine and closely-packed medullary rays.

North-West Himalaya ascending to 5,000 feet, Assam.
Weight, 55 lbs. per cubic foot. The wood is used for fuel and charcoal.

		lbs.
H 2947.	Jander, Sutlej Valley, 3,500 feet	55

5. GYNOCARDIA, R. Br.

1. G. odorata, R. Br.; Hook. Fl. Ind. i. 195; Kurz i. 76; Gamble 6. *Chaulmoogra odorata*, Roxb. Fl. Ind. iii. 835. Vern. *Chaulmúgri, petarkura*, Beng.; *Kadu*, Nep.; *Túk*, Lepcha; *Toungpung*, Magh.

A moderate-sized evergreen tree, readily known by the hard, round fruits which grow on the stem and main branches. Bark $\frac{1}{4}$ inch thick, grey, smooth. Wood hard, close-grained, yellow or light brown. Pores very small, in radial lines between the white, very numerous and prominent medullary rays.

Northern and Eastern Bengal and Assam, Chittagong and Burma.
Weight, 47 lbs. per cubic foot.
The wood is used in Chittagong for planking and for posts, and the pulp of the fruit in Sikkim to poison fish. The seeds give by expression a thick oil, used in the treatment of cutaneous diseases, especially leprosy.

		lbs.
E 708.	Chittagong	47

ORDER X. PITTOSPOREÆ.

An order containing one genus of Indian trees or shrubs, the remaining genera

Prongzam, Lepcha, is a common small tree of the outer Himalaya from the Jumna to Bhutan ascending to 8,000 feet, the Khasia Hills and Western Ghâts.

ORDER XI. POLYGALEÆ.

cus arillata, of Northern Kurz i 79), 08 (*S inap-* tern Bengal, *flavescens,* according to

evergreen trees of Burma.

ORDER XII. TAMARISCINEÆ.

A small order containing bushes or small trees with small sessile or scale like sheathing leaves two genera, *Tamarix* and *Myricaria*

Wood white or reddish, sometimes darker in the centre, but no heartwood. Pores small to moderate-sized, often in groups, more numerous and large in the spring wood wherever the annual rings are distinct. Medullary rays generally moderately broad to broad, short, distant.

1. TAMARIX, Linn.

Bushes or small trees, with scale like leaves and white or pink flowers, chiefly found on the banks of streams and on the lowlands near rivers There are six species, of which the most important are *T articulata*, Vahl, *T dioica*, Roxb, and *T gallica*,

gallica.

1. T. dioica, Roxb. Fl. Ind. ii. 101; Hook. Fl. Ind. i. 249, Beddome xx; Brandis 21; Kurz. i. 83, Gamble 6; Vern *Lei, pilchi, koan, kachlei*, Pb; *Gaz, láo, jau*, Sind; *Lal jhau*, Beng.; *Jau*, Hind

A gregarious shrub. Bark grey with reticulate cracks, shewing the red inner bark. Wood moderately hard, red, outer portion white. Pores small to moderate-sized, in groups or short radial lines, more abundant and larger in the spring wood. Medullary rays very promi-

nent, short, fine to very broad, very prominent on a radial section. The distance between the rays is generally three or four times the transverse diameter of the pores.

Throughout India from Sind to Burma. Often planted for ornament.

Of the rate of growth, little is known. Minniken, in his report of 1878 on the Delhi Bela plantation, gives the following measurements of seven trees in the 4th (Jaffar Khan) compartment, 3 years old, 8 to 15 feet high:—

No. 1	25 inches	Average 13 inches or 1·4 rings per inch, which is fast.
" 2	18 "	
" 3	15 "	
" 4	14 "	
" 5	12 "	
" 6	6 "	
" 7	3 "	

Weight, 49 lbs. per cubic foot. The wood is used mainly for fuel, but also for the supporting sticks of roofs.

		lbs.
P 888.	Multan	48
P 1388.	Lahore	51

2. T. articulata, Vahl.; Hook. Fl. Ind. i. 249; Beddome xx; Brandis 22. Vern. *Farás, farwa, rúkh, ukhan, kharlei, narlei,* Pb.; *Asrelei,* Sind.

A moderate-sized tree, with grey rough bark, coppices well, and is easily reproduced either by seed or by cuttings; wood white, moderately hard; annual rings indistinct. Pores moderate-sized, often in groups, scanty. Medullary rays short, fine to very broad, the distance between the rays somewhat greater than the transverse diameter of the pores; prominent on a radial section as irregularly shaped plates, giving the wood a mottled appearance.

Punjab and Sind.

"Growth rapid, trees 12 years old, on an average attain a girth of 2 to 3 feet, one 15 years old measured 4 ft. 10 in. in girth, and it is stated that at times it attains 5 ft. in 7 years."—*Brandis.* "It grows very rapidly and to a large size, and I have frequently seen trees of 10 to 12 feet girth and 60 or 70 feet high."—*J. L. Stewart, Punjab Plants,* p. 92.

Weight: Brandis says, 40 to 60 lbs. when seasoned; Stewart says, 92 lbs. per cubic foot green and 60 lbs. dry; the specimen received weighed 61 lbs. Wood used for many kinds of ordinary work, for ploughs, Persian wheels and small ornaments, and for charcoal. The bark is used for tanning as well as the galls (*Mái,* Punjab; *Sakun,* Sind) which are also used as a mordant in dyeing.

		lbs.
P 886.	Multan	61

2. MYRICARIA, Desvaux.

The genus contains, besides the species given below, *M. elegans,* Royle, a small bush of the inner Western Himalaya and Tibet, where it is very valuable as fuel.

1. M. germanica, Desv.; Hook. Fl. Ind. i. 250; Brandis 23. Vern. *Bis, shalakát, kathi, humbu,* Pb.; *Ombu,* Lahoul.

A shrub with rough brownish bark. Wood hard, white. Annual rings marked by porous spring wood. Pores small, medullary rays broad, short, very numerous and prominent.

Inner Himalaya from Punjab to Sikkim.

Wood used for fuel, and the branches as fodder for sheep and goats.

		lbs.
H 133.	Lahoul, 10,000 ft.	...
E 974.	Chumbi Valley, Tibet, 10,000 ft.	...

Order XIII. HYPERICINEÆ.

A small order with three Indian genera One, *Ascyrum*, contains only one small plant from Sikkim *Hypericum*, a number of herbs and small shrubs of the Himalaya, the most common of which are *H cernuum*, Roxb Fl Ind iii 400, Hook Fl Ind i 253, a handsome small shrub with large bright yellow flowers, found in the Western Himalaya especially on rocks, and *H Hookerianum*, W and A, Hook Fl Ind i 254, Gamble 6. Vern *Tumbomri*, Lepcha (E 2861, Darjeeling, 7,000 ft (43 lbs)) a

1. CRATOXYLON, Bl.

A genus of five trees from Burma and the Andaman Islands containing besides the one described, *C formosum*, Bth and Hook f, from the Andamans, and *C pruniflorum*, Kurz, *C polyanthum*, Korth, and *C arborescens*, Bl, from Martaban and Tenasserim

1. C. neriifolium, Kurz i. 85.; Hook. Fl. Ind. i. 257. Vern. *Baibya*, Burm.

A tree. Bark dark coloured, rough. Wood dark grey, hard, close-grained. Pores large, in short narrow wavy irregular patches of softer tissue. Medullary rays not prominent, fine, numerous, on a radial section visible as dark narrow plates.

Chittagong and Burma

Weight, 47 lbs per cub ft. According to Kurz, the wood is used for building purposes, for ploughs, handles of chisels, hammers and other implements

		lbs
B 312	Burma (1867)	47

Order XIV. GUTTIFERÆ

An order of tropical trees, containing six genera, belonging to two tribes, *viz* —

Tribe I—Garcinieæ . .	*Garcinia* and *Ochrocarpus*
„ II—Calophylleæ .	*Calophyllum*, *Kayea*, *Mesua* and

Of *Ochrocarpus*, there are three species
Fl Ind i 270, Beddome t 89 Vern
Mal, *Wündi*, *taringi* (♂), *poone* (♀), *suringi*, *garaunai* (♀), *kan*, is a large,

but referred to this
Beddome t 3 Vern.
from South Kanara
hard wood used for
li, is a large tree of
the Ghats of Tinnevelly and Travancore with a valuable, hard, reddish timber, used for building, and to make walking sticks

species of *Garcinia*),
gene[illegible] . . . ole in size. Medullary
rays [illegible] bands of soft texture
across the rays.

1. GARCINIA, Linn.

A large genus of evergreen, opposite leaved trees, usually with a yellow juice,

generally giving a more or less pure description of gamboge. They chiefly come from the tropical regions of India, none of them extending to Northern and Central India, and only one or two as far as Northern Bengal. There are about 22 Indian species, the synonymy of which is somewhat confused.

The following is Dr. T. Anderson's list, given at pages 259 to 270 of Hooker's Flora Indica, Kurz's species being added in brackets :—

SECTION I.—GARCINIA.

1. *G. Mangostana*, Linn.; Roxb. Fl. Ind. ii. 618; Kurz i. 87. The Mangosteen. Vern. *Mengkop, youngzalai*, Burm. In Helfer's "Report on the Provinces of Ye, Tavoy and Mergui" of 1839, he says that "a full-grown tree yields 1,000 fruits, which at the lowest can be reckoned at Rs. 3 per 100," and that "the integument of the fruit yields a very strong and valuable tan."	Cultivated in South Tenasserim.
2. *G. cornea*, Linn.; Roxb. Fl. Ind. ii. 629; Kurz i. 88. "Wood brown, heavy; gives an inferior kind of gamboge."—*Kurz*.	Eastern Bengal and Burma.
3. *G. speciosa*, Wall.	Tenasserim and Andamans.
4. *G. indica*, Choisy (*G. purpurea*, Roxb. Fl. Ind. ii. 624; Beddome xxi). *Brindall*, Goa. "The fruit has an agreeable, acid flavour, a syrup is made from it; the seeds furnish a concrete oil called *Kokum* in Bombay."	Ghâts of Concan and Kanara.
5. *G. Cambogia*, Desrouss.	Western Ghâts.
6. *G. Cowa*, Roxb.	Assam, Bengal, Burma and Andamans.
7. *G. lanceæfolia*, Roxb. Fl. Ind. ii. 623; Kurz i. 91. (*G. purpurea* Wall.) Vern. *Kirindur*, Sylhet.	Assam, Sylhet and Chittagong.
8. *G. loniceroides*, T. And. (*G. succifolia*, Kurz i. 91). "Wood white, perishable; yields little and inferior gamboge."—*Kurz*.	Swamp forests in Pegu.
9. *G. pedunculata*, Roxb. Fl. Ind. ii. 625; Gamble 7. Vern. *Tikil, tikur*, Beng.; *Borthekra*, Ass.; cultivated for its fruit. "Wood used for planks, beams, and ordinary building."—*Mann*.	Rangpur, Goalpara and Sylhet.
10. *G. Morella*, Desrouss.	Assam. Eastern Bengal, South India.
11. *G. heterandra*, Wall. (*G. elliptica*, Wall.; Kurz i. 49). Vern. *Thanat-tau*, Burm. "Wood soft, white; yields a superior quality of gamboge."—*Kurz*.	Hills of Burma up to 3,000 feet.
12. *G. Wightii*, T. And. . . . . . . "The gamboge of this species is very soluble and yields a good pigment."—*T. And.*	South India.
13. *G. paniculata*, Roxb. Fl. Ind. ii. 626; Kurz i. 92. Vern. *Búbi-kowa*, Sylhet.	Eastern Himalaya, Khasia Hills, Sylhet and Chittagong.
14. *G. atro-viridis*, Griff.	Upper Assam.
15. *G. anomala*, Pl. and Trian.; Kurz i. 89. Vern. *Usaqueng*, Ass.	Khasia Hills, and hills of Martaban, 3,000 to 6,000 feet.

SECTION I.—GARCINIA—*continued.*

16. *G. stipulata*, T. And.; Gamble 7. Vern. *Sanakadan*, Lepcha. "Fruit yellow, sometimes eaten by Lepchas; the tree and fruit give a yellow gum, but it does not seem to be used."—*Gamble.*	Sikkim and Bhutan, up to 4,000 feet.
17. *G. merguensis*, Wight; Kurz i. 89 . . .	Tenasserim.
18. *G. travancorica*, Beddome t. 173 (G. sp. 2. Beddome xxi). Vern. *Malampongu*, Tinnevelly. "Every portion of the tree yields an abundance of bright yellow gamboge, not yet examined."—*Beddome.*	Forests of Travancore and Tinnevelly.
19. (*G. microstigma*, Kurz i. 91)	Andamans.

SECTION II.—XANTHOCHYMUS.

20. *G. Xanthochymus*, Hook. f.; Kurz i. 93. *Xanthochymus pictorius*, Roxb. Fl. Ind. ii. 633; Beddome t. 88. Vern. *Tepor*, Ass.; *Maohla*, Phekial; *Dampel*, Hind.; *Iwara memadi, tamalamu, chitakamraku*, Tel.; *Mataw*, Burm. "Yields a large quantity of indifferent gamboge."—*Roxburgh.*	Eastern Himalaya, Eastern Bengal, Burma, South India.
21. *G. oval*[illegible] F [illegible] L [illegible]	Western Ghâts.
22. *G. dulci*[illegible] . . Ind. ii. [illegible]).	Andamans.

Wood close-grained, hard. Pores small to large, subdivided. Numerous concentric bands of softer texture. The structure of the wood of the species of *Garcinia* is not uniform. *G. Cowa* and *G. Morella* have similar wood, while *G. speciosa* differs by having fine medullary rays and *G. Cambogia* by the absence of distinct concentric rings. The structure of the *Garcinias* requires further investigation.

1. **G. speciosa**, Wall.; Hook. Fl. Ind. i. 260; Kurz i. 88. Vern. *Palawa*, Burm.

An evergreen tree. Bark thin, greyish-black. Heartwood red, very hard, cross-, and close-grained. Pores small, very numerous. Numerous short, wavy, transverse bands joining the pores. Medullary rays very fine, uniform, equidistant, not very distinct, the distance between two rays about equal to the transverse diameter of the pores.

Tenasserim and the Andaman Islands.

Weight, according to Major Protheroe, 72 lbs.; our specimens give only 52 lbs. and Wallich (Nos. 73, 74, *Garcinia* sp., *Pullowa*) 45·5 lbs.

Used for house and bridge posts, and other purposes; said to be used by the Andamanese to make bows.

			lbs.
B 504.	Andaman Islands		52
B 2192.	Do.	(Home, 1874, No. 18)	52

Two specimens marked B 2193 *Pantagah*, No. 20. (51 lbs.), and B 2,500 *Phungnyet*, No. 19 (62 lbs.), brought by Home from the Andamans in 1874 resemble *G. speciosa*, but the pores are in short radial lines and the medullary rays more distinct.

B 2203 (47 lbs.), received from the Andamans in 1866 under the name of *Thingannee* is similar in structure to B 2193 and 2500, but the pores are larger.

2. G. Cambogia, Desr.; Hook. Fl. Ind. i. 261; Beddome t. 85; Roxb. Fl. Ind. ii. 621. Vern. *Aradal*, Kan.; *Heela*, Burghers.

A small evergreen tree. Wood grey, cross-grained, shining, hard. Pores small and very small, in short radial lines, between the closely packed, uniform, very fine medullary rays. Concentric bands present, but indistinct.

Western Coast and Ceylon.

Weight, 54 lbs. per cubic foot. Beddome says the wood would answer for common furniture.

Thwaites states that this tree yields a yellow insoluble gum, which is consequently valueless as a pigment. It is, however, said to be soluble in spirits of turpentine, and to form a beautiful yellow varnish. Mr. Cherry says it gives an oil which is used in medicine.

		lbs.
W 845.	South Kanara	54

3. G. Cowa, Roxb. Fl. Ind. ii. 622; Hook. Fl. Ind. i. 262; *G. Cowa* and *G. Kydia*, Roxb.; Kurz i. 90. Vern. *Cowa*, Hind.; *Toungthalay*, Burm.

A tall evergreen tree with round stem and dark grey bark. Wood greyish-white, moderately hard. Pores moderate-sized to large, scanty, often subdivided. Medullary rays fine to broad. Numerous, wavy, concentric bands of soft tissue across the rays.

Eastern Bengal, Assam, Chittagong, Burma and the Andaman Islands.

Weight, 42 lbs. per cubic foot (Brandis 1862, No. 19); our specimens give an average of 40 lbs. Kyd gives weight 47 lbs., P = 815. Wood not used. Is said to give a kind of gamboge of a rather different colour to that produced by *G. Morella.*

		lbs.
B 549.	Martaban.	43
B 3148.	Burma (1862)	37

4. G. Morella, Desrouss.; Hook. Fl. Ind. i. 264; Thwaites Enum. 49; Beddome t. 86. *G. pictoria*, Roxb. Fl. Ind. ii. 627; Beddome t. 87. *G. Gutta*, Wight. The Gamboge Tree. Vern. *Aradal, punar puli*, Kan.; *Gokatú, kana-goraka*, Cingh. (The gum resin, *Gota gamba*, Hind.; *Makki*, Tam.; *Revachinni*, Mar.; *Sanatosi*, Burm.; *Gokatu*, Cingh.)

An evergreen tree. Wood yellow, hard, mottled. Pores large, subdivided. Medullary rays moderately broad. Numerous, wavy, concentric bands of soft texture across the rays which are narrower than in *G. Cowa.*

Forests of the Khasia Hills, Eastern Bengal, Western Coast, and Ceylon.

The tree which produces the true gamboge. The gum is, however, not collected in the forests of South India, and the chief trade supply is obtained from Siám. In Ceylon it is usually collected by cutting a thin slice off the bark of the tree here and there of the size of the palm of the hand. On the flat space thus exposed the gum collects and is scraped off when sufficiently dried.

	lbs.
No. 14, Ceylon collection (marked *Cambogia Gutta*, Vern. *Cocatiye*) .	56

2. CALOPHYLLUM, Linn.

A large genus of chiefly tropical trees, of which many species occur in the Malay Peninsula and Ceylon. Six species occur in India, of which four in Burma and the Andamans, three in Southern India and one in Northern and Eastern Bengal. Five species are herein described, and the remaining species is *C. retusum*, Wall.; Hook. Fl. Ind. i. 272 (*C. amœnum*, Wall.; Kurz i. 95), an evergreen tree of Tenasserim. The genus is remarkable for its handsome flowers and beautiful parallel-veined, opposite, coriaceous leaves.

Wood soft and moderately hard, reddish, with a darker coloured heartwood, seasons well, weight moderate Pores moderate-sized or large, prominent on a vertical section, often arranged in wavy strings or groups. Medullary rays fine or very fine, indistinct on a cross section but prominent as straight narrow lines on a radial section. Interrupted concentric lines of soft tissue.

1. C. spectabile, Willd , Hook. Fl Ind i 271, Kurz i. 91; *C. Moonii,* Wight, Beddome xxii., *C amœnum,* Wall. in Exhibition Catalogue; *C. tetrapetalum,* Roxb. Fl Ind ii 608 Vern *Panta-ka,* [illegible] Hind (from Andamans) [illegible] cross-grained, moder- [illegible] wavy lines prominent [illegible] ery numerous, promi- nent on a radial section as long, straight, dark-coloured narrow plates. Concentric lines of soft tissue divide the wood into what at first sight appear to be annual rings, but on closer examination are found to be interrupted, and cannot be held to be the lines which mark the annual increment, these lines are visible on a vertical section.

Tenasserim and Andaman Islands

Weight, 38 39 lbs per cubic foot No 13, from the Andaman Islands, of Brandis' experiments of 1866 is probably this Weight, 39 5 lbs P = 530—mean of 8 experiments with bars 2′ × 1″ × 1″

The wood is used for masts and spars, also for planking for which purpose it has lately been used in building barracks in the Andamans

			lbs
B	525	Andaman Islands	39
B	1992	„ „ (Kurz, 1866)	38
B	3197.	„ „ (Home, 1874, No 14, *Teeni*) . . .	39

2. C. inophyllum, Linn., Hook. Fl Ind i 273, Beddome xxii , Kurz i. 95, Roxb Fl. Ind ii 606 The Alexandrian Laurel Vern *Sultana champa,* Hind., Beng., *Pinnay,* Tamil, *Púna, púnás,* Tel., *Wúma,* Kan., *Undi,* Mar.; *Domba,* Cingh ; *Pongnyet,* Burm , *Bintangor,* Malay.

An evergreen tree. Bark grey or blackish-brown, smooth. Wood reddish-brown, moderately hard, close-grained Pores small and moderate-sized, arranged in groups. Medullary rays extremely fine and numerous. Numerous, not very prominent, interrupted concentric lines of soft tissue.

South India, Burma and Andaman Islands, often cultivated for ornament in other parts of India

[illegible] the specimens received averaged [illegible] "Used for masts, spars, railway [illegible]

			lbs.
W	733	South Kanara	38
B	2257	Andaman Islands (1866)	45
B	2258	„ „ „	44
B	2263	„ „ „	26

3. C. polyanthum, Wall , Hook. Fl Ind i. 274; Kurz i 95; Gamble 7. Vern. *Kandeb,* Beng., *Kironli,* Nep , *Sunglyer,* Lepcha

An evergreen tree. Structure the same as that of *C. spectabile.*

Northern and Eastern Bengal, Khasia Hills, Chittagong and Burma, ascending to 5,000 feet

Weight, 40 lbs. per cubic foot. Mr. Chester says it is used largely in Chittagong for masts, spars and rafters, and sometimes for small boat building and canoes.

		lbs.
E 1400.	Chittagong	44
E 2490.	Chenga Forest, Darjeeling Terai	38
E 2953.	Chunbati, Darjeeling, 3,000 feet	39

These last two have the same structure as *C. polyanthum*, but the wood has a dark red colour.

4. **C. tomentosum,** Wight; Hook. Fl. Ind. i. 274; Beddome xxii. *C. elatum,* Beddome t. 2. The Poon Spar Tree. Vern. *Poon, poone,* Mal.; *Pongoo,* Tamil; *Siri poone,* Kan.

A large, tall, evergreen tree. Bark with numerous longitudinal cracks. Structure the same as that of *C. spectabile.*

Evergreen forests of the Western Coast from Kanara southwards.

Weight: Couch's experiments at Plymouth Dockyard gave 36 to 43 lbs. per cubic foot; our specimens give 35 lbs. per cubic foot. Yields the Poon spars of commerce, good spars often fetching large prices. It is also used for building and bridge work. The seeds give an oil.

		lbs.
W 762.	South Kanara	32
D 1279.	Anamalai Hills	38

5. **C. Wightianum,** Wall.; Hook. Fl. Ind. i. 274; Beddome t. 90. *C. decipiens,* Wight Ic. 106. Vern. *Kalpoon, kull-ponné,* Kan.; *Cheru pinnay,* Tam.

An evergreen tree. Wood hard, red. Pores large and moderate-sized, uniformly distributed. Medullary rays very fine, not very distinct. Numerous interrupted, wavy and anastomozing concentric bands of soft tissue.

Western Ghâts from the Konkan to Travancore.

Weight, 45 lbs. per cubic foot. It is probably No. 36 of Skinner's List (*C. spurium*) W = 39 lbs.; P = 567. Beddome says the timber is much esteemed and valuable for engineering purposes.

		lbs.
W 861.	South Kanara	45

3. KAYEA, Wall.

Two Indian and one Ceylon species. *K. floribunda,* Wall.; Hook. Fl. Ind. i. 276; Kurz i. 96. Vern. *Karram-jowa,* Sylhet, is a tree of the tropical forests of the Eastern Himalaya and of the hills of Martaban, ascending to 3,000 feet. *K. nervosa,* T. And.; Hook. Fl. Ind. i. 277; Kurz i. 97 is an evergreen tree of Tenasserim.

1. **K. stylosa,** Thwaites Enum. 50; Hook. Fl. Ind. i. 276; Beddome t. 102. Vern. *Súvanda,* Cingh.

A large tree. Bark dark grey. Wood soft, reddish. Pores moderate-sized, numerous. Medullary rays very fine, indistinct, with concentric bands of soft texture across the rays.

A. Mendis gives the weight at 56 lbs. and P = 814.

	lbs.
Ceylon, south of the island. No. 82, Ceylon collection	56

4. MESUA, Linn.

Beddome gives six species of this genus, but all these are included in the Flora Indica by Dr. T. Anderson under one, *Mesua ferrea.* In the "Genera Plantarum" there are said to be three species. These include *M. Thwaitesii,* Pl. and Trian., of Ceylon, and a species from Malacca.

1. **M. ferrea,** Linn, Hook Fl Ind i 277, Roxb Fl Ind ii 605, Kurz i 97, Beddome xxiii (with also *M speciosa,* Choisy, *M Roxburghii,* Wight, *M sclerophylla,* Thw, *M pulchella,* Pl and Trian, and *M coromandeliana,* Wight, Beddome t 64), Thwaites Enum 50 Vern *Nagesar,* Beng, *Nahor,* Ass, *Nageshvoro,* Uriya, *Nangal, mallay nangal,* Tam, *Naga kesara,* Tel, *Nang,* Tinnevelly, *Naga sampigi,* Kan, *Nag champa,* Mar, *Behetta champagam,* Mal, *Na, deya ná,* Cingh, *Kaing go,* Magh, *Gangau,* Burm

A large evergreen tree Heartwood dark red, extremely hard Pores moderate sized, often in groups, scanty, often filled with yellow resin Medullary rays extremely fine, uniform, equidistant, very numerous. Numerous fine, wavy, concentric lines of light-coloured tissue

Eastern Bengal from the Monas eastward (though traces of its having formerly been found west of that river occur sometimes in the names of places e g Nageshwarbari or Naksarbari a town in the Sikkim Terai on the Nepal frontier), Assam South India Ceylon Burma and the Andamans often cultivated

The weight and transverse strength have been determined by the following experiments —

		Weight	Value of P
A Mendis	Ceylon No 59 with bars 2 × 1′ × 1″ found	72 lbs.	994
Brandis	Burma No 18 1862 ,	69 „	
Bennett	Andamans No 4 1872	70	1053
Smythies	Assam (4 specimens) 1878 ,	67 5 ,	
	Kanara (1 „) „ ,	62 ,	
	Burma (6 ,) ,	70 ,	

Several of our specimens however reached 74 to 76 lbs per cubic foot in weight It is very durable It has been found to answer for sleepers equally well with [illegible]

[illegible] but its more general use is prevented by its great hardness weight and the difficulty of working it In Ceylon an oil is obtained from the nut and the tree is often planted for the sake of its handsome flowers

			lbs
E	2300	E Duars Assam	64
E	703	Kamrup ,	61
E	2190	Nowgong „	75
E	1273	Cachar	70
W	741	South Kanara	62
B	2504	Burma (1862)	69
B	554	Martaban	75
B	2700	Tavoy (Wallich 1828)	60
B	2238	Andamans (Major Ford 1866)	76
B	2491	, (Home, 1874, No 10)	67
B	520	,	74
No	*59*	*Ceylon Collection (Mesua Nagaha)*	*72*

ORDER XV TERNSTROMIACEÆ

Twelve genera belonging to three tribes viz —

Tribe I —Ternstromieæ	*Anneslea, Ternstromia Adinandra Cleyera* and *Eurya*
„ II —Saurauieæ	*Actinidia, Saurauja* and *Stachyurus*
„ III —Gordonieæ	*Pyrenaria, Schima, Gordonia* and *Camellia*

Anneslea contains two small trees of Burma: *A. fragrans*, Wall.; Hook. Fl. Ind. i. 280; Kurz i. 98, of the Eng forests, and *A. monticola*, Kurz i. 98, of the hill forests of Martaban at 5,000 to 7,000 feet. *Ternströmia*, two trees of South India and Burma: *T. japonica*, Thunb.; Hook. Fl. Ind. i. 280; Kurz i. 99 (*T. gymnanthera*, Beddome t. 91). Vern. *Kaymonc*, Nilgiris, an evergreen tree of the Western Gháts and the Martaban Hills, said by Beddome to have a pinkish wood, used for house-building; and *T. penangiana*, Choisy; Hook. Fl. Ind. i. 281; Kurz i. 99, an evergreen tree of the Andamans and Tenasserim. *Adinandra villosa*, Choisy; Hook. Fl. Ind. i. 283; Kurz i. 100, is an evergreen tree of Pegu. *Cleyera ochnacea*, DC., and *C. grandiflora*, Hook. f. and Th.; Hook. Fl. Ind. 283, 284, are small trees of the North-Eastern Himalaya and Khasia Hills. *Actinidia* contains two climbing shrubs: *A. callosa*, Ldl. (No. E. 2858, Tukdah Forest, Darjeeling, 5,000 feet, with corky bark and brown, very porous wood) at about 5,000 feet, from Garhwal to Bhutan and the Khasia Hills, and *A. strigosa*, Hook. f. and Th., of the Sikkim Himalaya, at 6,000 to 8,000 feet: both, Hook. Fl. Ind. i. 286; Gamble 8. Vern. *Tikphal*, Nep.; *Taksing*, Lepcha. Fruit edible, of good flavour. *Stachyurus himalaicus*, Hook. f. and Th.; Hook. Fl. Ind. i. 288, is a small glabrous tree of the Eastern Himalaya from 5,000 to 8,000 feet.

In *Pyrenaria* are four evergreen trees: three of which, *P. attenuata*, Seem.; Hook. Fl. Ind. i. 290 (*P. serrata*, Bl.; Kurz i. 105) of Tavoy; *P. diospyricarpa*, Kurz i. 101, and *P. camelliæflora*, Kurz i. 105, of the Martaban Hills, are Burmese: and one, *P. barringtoniæfolia*, Seem.; Hook. Fl. Ind. i. 290, of the Gáro Hills in Assam. *Gordonia obtusa*, Wall.; Hook. Fl. Ind. i. 291; Beddome t. 83. Vern. *Nagetta*, Nilgiris, is a tall grey-barked tree of the Western Gháts, said by Beddome to have a yellowish-white, even-grained wood, used for house-building, but liable to warp. *G. excelsa*, Bl.; Hook. Fl. Ind. i. 291, is a tree of the Bhutan Himalaya.

Pores small, uniformly distributed between the fine or very fine medullary rays. The species of *Eurya* have a few broader rays alternating with the fine rays.

1. EURYA, Thunb.

A genus of evergreen shrubs or small trees, of the Eastern Himalaya, Assam, Southern India, and Burma. *E. japonica*, Thunb.; Hook. Fl. Ind. i. 284; Beddome t. 92; Brandis 24; Kurz i. 101; Gamble 7. Vern. *Baunra, gonta, deura*, Hind.; *Jhingni*, Nep.; *Tungchong*, Lepcha; *Hoolooni*, Nilgiris; *Toungletpet*, Burm., is found in the Himalaya from the Jumna eastwards, above 3,000 feet in altitude, in the Western Gháts and in Burma. It grows quickly and often gregariously in the Sikkim hills, and coppices well. *E. trichocarpa*, Korth. is a small tree of Bhutan and the Khasia Hills.

1. E. symplocina, Bl.; Hook. Fl. Ind. i. 284; Kurz i. 102; Gamble 7. Vern. *Bara jhingni, kisi*, Nep.; *Flotungchong*, Lepcha.

A small evergreen tree. Bark brown, thin. Wood reddish-white, soft, close-grained. Annual rings marked by more numerous pores in the spring wood. Pores very small. Medullary rays very fine and moderately broad, the latter short, prominent.

Hills of the North-Eastern Himalaya, from 5,000 to 7,000 feet, Burma.
Weight, 38 lbs. per cubic foot. Used only for firewood.

		lbs.
E 385.	Rangbúl, Darjeeling, 7,000 feet	35
E 2319.		42

2. E. acuminata, DC.; Hook. Fl. Ind. i. 285; Kurz i. 101; Gamble 7. Vern. *Sanu jhingni*, Nep.; *Flotungchong*, Lepcha.

A small evergreen tree. Bark brown, thin, smooth. Wood differs from that of *E. symplocina* in having the larger medullary rays less broad and less prominent.

Hills of the North-Eastern Himalaya, Assam and Martaban, from 5,000 to 8,000 feet.

Weight accor ling to Kyd 32 lbs , our specimen however weighed 47 lbs
Kyd s experiments on a bar 2 × 1 × 1 gave P = 337 for wood from Goalpara

		lbs
E 2320	Pangbul Darjeeling 7 500 ft	47

2 SAURAUJA, Willd

A genus of trees or shrubs with handsome parallel veined generally scaly and rusty tomentose leaves and pink or white flowers Of the eight Indian species five are found in Burma and six in the Eastern Himalaya Besides the species here described *S Griffithii* Dyer Hook Fl Ind i 286 Gamble 8 Vern *Gogen* Nep *Hlosipha*, Lepcha is an extremely hand
densely yellow tomentose bene
Hook Fl Ind i 287 Gambl
Sikk m and *S punduana*
Rata gogen Nep *S pha*
or shrubs *S Roxburghii* Wall Hook Fl Ind i 287 Kurz i 103, Gamble 287
ip Sylhet *Ouli gogen* Nep ,
Sikkim the Khasia Hills and
Kurz i 104 (*Ternstromia*

1 S napaulensis, DC , Hook Fl Ind i 286, Brandis 25, Gamble 8 Vern *Gogina, goganda*, Hind , *Gogen*, Nep , *Kasur*, Lepcha

A small tree. Bark reddish-brown, thin Wood light pink, very soft spongy, shrinks much Pores small Medullary rays fine and moderately broad, prominent on a radial section

Outer Himalaya from the Jumna to Bhutan above 3 000 feet Khasia Hills
Weight 25 lbs per cubic foot Leaves lopped for cattle fodder

		lbs
E 2321	Tukdah Darjeeling 5 000 feet	25

3 SCHIMA, Reinw

Six species *S crenata* Korth , Hook Fl Ind i 289 Kurz i 107 (*Gordonia oblata* Roxb Fl Ind ii 572 *G floribunda* Wall) is an evergreen tree of Burma *S khasiana* Dyer Hook Fl Ind i 289 is a
S monticola Kurz i 107 is a tree of the
Martaban at 6 000 to 7 200 feet and *S banca*
Eng forests of Martaban and Tenasserim

1 S Wallichii, Choisy, Hook Fl Ind i 289, Gamble 8 *Gordonia integrifolia*, Roxb Fl Ind ii 572 Vern *Chilauni, goechassi*, Nep , *Makusal*, Hind , *Sumbrong*, Lepcha, *Gugera*, Goalpara, *Makriah chilauni, makusal*, Ass , *Dingan*, Khasia, *Bol lak*, Garo, *Jam*, Cachar

A large evergreen tree Bark black or dark grey with deep vertical cracks Wood rough, red, moderately hard, shrinks much in seasoning, but is durable Pores moderate sized and small, round, extremely numerous and uniformly distributed Medullary rays very fine, uniform, equidistant, very numerous on a radial section visible as narrow, darker coloured plates

strength —

			Weight	P =
Kyd with Goalpara wood in 1831 No 48	bar 2 ′ × 1 × 1		found 13 lbs	383
Brandis with Sikkim in 1864	bar 6 × 2 × 2		„ 45	700
Smythies with our four specimens in 1878			„ 15 „	

ORDER XVI DIPTEROCARPEÆ.

An order of great forest importance containing large resinous trees and a few climbing shrubs belonging to seven genera, *viz*, *Dipterocarpus* *Ancistrocladus*, *Anisoptera*, *Vatica*, *Shorea*, *Hopea* and *Vateria* *Doona* and *Monoporandra* are

liquid by incision

The Dipterocarpeæ here described have a uniform structure The pores are round, oft ly moderate-sized, enclosed in a are fine and moderately broad, is generally distinct, dark coloured, heavy (from 40 to 70 lbs) and resinous, exuding wood oils or dammer, which are found, not in separate resinous ducts, but in the pores (vessels) of the wood The wood of most species is hard, strong and durable, that of several species of *Dipterocarpus* is softer and perishable

1 DIPTEROCARPUS, Gaertn f

Twelve species, all lofty trees, of Eastern Bengal, South India and Burma These species are —

1 *D turbinatus*, Gaertn f	Eastern Bengal, Burma and Andamans
2 *D lævis*, Ham	Burma
3 *D vestitus*, Wall Hook Fl Ind i 295	Tavoy
4 *D obtusifolius* Teysm	Hills of Prome and Martaban
5 *D pilosus* Roxb Fl Ind ii 615 Hook Fl Ind i 296, Kurz i 115 Vern *Hollong* Ass ' Rarely used for canoes does for planks —*Mann*	Arracan hills of Martaban and Tenasserim
6 (*D Hasseltii* Bl Kurz i 114)	Tenasserim and Andamans
7 *D tuberculatus*, Roxb	Chittagong and Burma
8 *D scaber* Ham , Hook Fl Ind i 297	Eastern Bengal
9 *D alatus* Roxb	Chittagong Burma and Andamans
10 *D incanus* Roxb Fl Ind ii 614, Hook Fl Ind i 298	Chittagong ,
11 *D Griffithii* Miq , Hook Fl Ind i 299, Kurz i 116	Tenasserim and Andamans.
12 (*D costatus* Gaertn , Kurz i 117 Under *D alatus* in Hook Fl Ind i 298)	Hills of Chittagong, Martaban and Tenasserim

and Kurz'
Kurz, the
Vol xvi

The species of *Dipterocarpus* have a reddish, soft or moderately hard heartwood, generally rough Pores visible on a vertical section, moderate-sized to large Medullary rays often of two sizes, fine and moderately broad.

1. D. turbinatus, Gaertn f , Hook Fl Ind i 295, Roxb Fl Ind ii 612, Kurz i 111 The Gurjun-Oil Tree Vern *Gurjun*, *tiliyagurjun*, Beng , *Kanyoung*, Magh , *Kanyin-nee*, *kanyin-wettoung*, Burm.

A lofty evergreen tree. Wood rough, moderately hard; heartwood reddish grey. Pores round, large and moderate-sized, joined by short concentric bands of soft tissue. Medullary rays prominent, broad and very fine, a large number of the latter intervening between a pair of the former; very prominent and shining on a radial section.

Eastern Bengal, Chittagong, Burma and the Andaman Islands.

Skinner, No. 64, gives the weight at 45 lbs. and P = 762; Kurz gives 55 lbs. for the weight, while our specimens average 50 lbs. per cubic foot. The wood is used for house-building and for canoes in Burma; and the wood-oil is used in painting houses and ships.

		lbs.
E 709.	Chittagong	49
B 293.	Burma (1867)	43
B 2216.	Andaman Islands (Major Ford, 1866)	52
B 2555.	Burma (1862)	56

2. D. lævis, Ham.; Kurz i. 114. *D. turbinatus,* Hook. Fl. Ind. i. 295 (in part). Vern. *Kanyin, kanyin-nee,* Burm.

A lofty tree. Sapwood white; heartwood rough, reddish, soft. Pores moderate-sized, numerous. Medullary rays red, fine, moderately broad and broad, visible on a radial section as long bands, the distance between two broader rays equal to two to four times the transverse diameter of the pores.

Tropical forests throughout Burma.

Weight: our specimens give an average of 46 lbs. per cubic foot. The wood is rarely used, but is occasionally employed for planking and rafters. It yields copiously a resin and a wood-oil used for painting.

		lbs.
B 292.	Burma (1867)	43
B 2506.	„ (1862)	49

D. indicus, Beddome t. 94. Vern. *Guga,* Kan., of the Western Ghâts, is referred to this or to *D. turbinatus* by Dyer.

3. D. obtusifolius, Teysm.; Hook. Fl. Ind. i. 295; Kurz i. 115. Vern. *Kanyin-kok,* Burm.

A large deciduous tree. Bark ¾ inch thick, ash-grey, longitudinally cracked, rough. Heartwood reddish brown, rough, moderately hard. Pores large and moderate-sized. Medullary rays fine and very fine, numerous.

Eng forests of Prome and Martaban, ascending to 3,000 feet.

Weight, 59 lbs. per cubic foot.

		lbs.
B 3128.	Kya-eng, Attaran Valley, Burma	59

4. D. tuberculatus, Roxb. Fl. Ind. ii. 614; Hook. Fl. Ind. ii. 297; Kurz i. 113. *D. grandiflorus,* Wall. The Eng Tree. Vern. *Eng,* Burm.; *Sooahn,* Taleing.

A large deciduous gregarious tree, with dark grey bark, forming the "Eng forests" of Burma. Wood red, hard. Pores circular, large and moderate-sized, often filled with resin. Medullary rays prominent, moderately broad, with a number of fine rays between each pair of broad ones; distance between broader rays as much as twice transverse diameter of pores.

Chittagong and Burma.

Weight: Brandis in Burma List of 1862, No. 12, gives 55 lbs.; Skinner, No 63, gives 45 and Benson 46 lbs.; while the average of our specimens gives 54 lbs. Benson

gives P=758, Skinner 750. The timber is very largely used in Burma for building, canoes, and house posts. It gives no wood oil, but a clear yellow resin.

		lbs
B 2505	Burma (1862)	50
B 306.	„ (1867)	52
B 2180	„	59

5. **D. alatus,** Roxb. Fl. Ind. ii. 614, Hook. Fl. Ind. i. 298; Kurz i. 116. Vern. *Gurjun,* Beng; *Kanyin, kanyin-pyoo,* Burm.

A very large tree with grey bark. Sapwood white, heartwood reddish grey, moderately hard, smooth, mottled. Pores scanty, large, often oval and subdivided. Medullary rays undulating, short, fine and moderately broad, not prominent. Pores prominent on a longitudinal section.

gives ... The

		lbs.
B 818	Burma	50
B 2243.	Andamans (1866) (rather eaten)	38

6. **D. zeylanicus,** Thwaites Enum. 33, Hook. Fl. Ind. i. 297; Beddome xxv. Vern. *Horá,* Cingh.

Heartwood red, moderately hard. Pores moderate-sized to very large. Medullary rays fine and moderately broad, frequently bending.

Ceylon, up to 3,000 feet

Weight, 45 lbs per cubic foot Wood used for building. It gives a wood oil and gum resin

		lbs
No 37	Ceylon collection	45

E 720 is a wood sent from Chittagong under the name *Michamma.* In structure it resembles *Dipterocarpus,* and differs chiefly by the very numerous, very fine, equidistant medullary rays The pores are joined by white, wavy concentric lines The wood is interrupted by concentric belts of fibrous substance resembling liber, about ¼ inch thick

E 1257. (43 lbs) from Tezpur, Assam, has the structure of *Dipterocarpus.*

... ng, *Chakyai,* Magh, from Chittagong, is ... it is distinguished by numerous broad and fine ... en subdivided pores

2. VATICA, Linn.

Six species. *V grandiflora,* Dyer, Hook Fl. Ind i 301 (*Anisoptera odorata,* Kurz i 112 *Hopea grandiflora,* Wall) is a deciduous tree of Martaban and ... Fl Ind i 301, and ... i 119). *V. scaphula,* ... 611, Kurz i. 121) ... Mascal island, whose trunk is used for making canoes *V Roxburghiana,* Bl, Hook Fl Ind. i 302, Beddome t. 95 Vern *Mendora,* Cingh, is a large tree of the Western Coast and Ceylon, yielding a gum resin

1. **V. lanceæfolia,** Bl.; Hook. Fl. Ind. i. 302; Kurz i. 122; Roxb. Fl. Ind. ii. 601. Vern. *Morhal,* Ass.; *Moal,* Sylhet; *Panthitya,* Burm.

A large tree. Heartwood red, rough, hard Pores small, numerous, uniformly distributed. Medullary rays fine, not distinct.

is 5 ...

A lofty evergreen tree. Wood rough, moderately hard; heartwood reddish grey. Pores round, large and moderate-sized, joined by short concentric bands of soft tissue. Medullary rays prominent, broad and very fine, a large number of the latter intervening between a pair of the former; very prominent and shining on a radial section.

Eastern Bengal, Chittagong, Burma and the Andaman Islands.

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B 2480	„	59

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Weight, 45 lbs per cubic foot Wood used for building It gives a wood oil and gum resin

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Six species *V grandiflora*, Dyer, Hook. Fl Ind i 301 (*Anisoptera odorata*, Kurz i 112 *Hopea grandiflora*, Wall) is a deciduous tree of Martaban and Tenasserim, where also are found *V faginea*, Dyer, Hook Fl Ind i 301, and *V Helferi*, Dyer, Hook Fl Ind i 301 (*Shorea Helferi*, Kurz i 119) *V scaphula*, Dyer, Hook Fl Ind i 301 (*Hopea scaphula*, Roxb Fl Ind ii 611, Kurz i 121) Vern *Boilshura*, Beng, is a tree of Chittagong, especially on Mascal island, whose trunk is used for making canoes *V Roxburghiana*, Bl , Hook Fl Ind i 302, Beddome t 95 Vern *Mendora*, Cingh, is a large tree of the Western Coast and Ceylon, yielding a gum resin

1. **V. lanceæfolia,** Bl , Hook. Fl Ind. i 302, Kurz i. 122, Roxb. Fl Ind. ii 601. Vern. *Morhal*, Ass , *Moal*, Sylhet; *Panthitya*, Burm

A large tree. Heartwood red, rough, hard Pores small, numerous, uniformly distributed. Medullary rays fine, not distinct.

rm.) the weight
per cubic foot

E

The wood is not very good. The tree

B 2508. Burma (1862) . .
B 2282. Andamans (1866) .

We identify this last by the structur
Andamans.

3. SHOR

Nine species. *S. floribunda*, Kurz. i. 1
tree of Tavoy. *S. assamica*, Dyer; Hoo
discovered by G. Mann on the banks of the
Fl. Ind. i. 307 (*Hopea gratissima*, Wall.;

Wood generally cross-grained.
hard. Pores moderate-sized to
patches of lighter coloured tissue. M

1. S. stellata, Dyer; Hook. Fl.
Kurz i. 117. Vern. *Koungmhoo*, Bu.

A very large evergreen tree.
longitudinally fissured. Wood w
moderate-sized to large, uniformly
substance; each pore enclosed in
rays moderately broad; the distance b
the transverse diameter of the pores.

Burma.

Weight, 47 to 50 lbs. The wood is a

B 1944. Tavoy, Burma . .
B 2481. Tenasserim . . .

2. S. Talura, Roxb. Fl. Ind. ii
S. laccifera, Heyne; Beddome t. 6.
Talura, talári, Tam.; *Jalári*, Tel.; *Ja*

A large tree. Bark grey, with
very to extremely hard, smooth, wi
shaped heartwood. Pores small
enclosed in patches of white tissue, wh
wavy, forming interrupted concentric
but alternating belts, with numero
rays fine, very numerous, frequently w

Mysore and the eastern districts of Madras

Weight: Puckle gives 43 lbs. per cubic
Puckle finds P = 896. The wood is much us
down to Madras for that purpose.

D 1056. South Arcot . . . .
D 1092. Madura . . . . .

D 1092 has a smooth, yellow, even-grainc
brownish-red heartwood, but the structure of

3. S. robusta, Gaertn.; Roxb.
Brandis 26; Kurz i. 119; Gamble
salwa, sákhu, sakher, Hind.; *Sakwa*, Ne,
Salwa, soringhi, Uriya; *Koroh*, Oudh;

A large gregarious tree, never quit
smooth with a few long, deep, vertical
thick, dark coloured, rough, with d

small, whitish, not durable. Heartwood brown, finely streaked with dark lines, coarse-grained, hard, with a remarkably fibrous and cross-grained structure, the fibres of successive concentric strata in the wood do not run parallel but at oblique angles to each other, so that when the wood is dressed the fibres appear interlaced, does not season well. Annual rings visible. Pores moderate-sized to large, often filled with resin, each pore or group of pores in a patch of whitish tissue Medullary rays uniform, moderately broad, straight, very prominent, joined by short white transverse lines, clearly visible on a radial section as numerous interrupted bands, the distance between the medullary rays equal to the transverse diameter of the pores

The wood of the
correspond to one yea
young trees (up to
to the age of the tree
collected Assuming, however that the concentric rings are annual, the following information is available regarding the rate of growth of sal

In 1873 Mr Fisher examined 40 sál trees in the Pantan Reserve, Kámrúp district,

wood only of 18, 36, 54 and 72 inches

In 1874 he examined 32 trees in
10 trees of 1 foot 6 inches girth gav
of radius, 10 trees of 3 feet girth g
10 trees of 4 feet 6 inches girth ga
5 feet 7 inches girth gave 110 ring
girth gave 122 rings, or 10 6 rings per inch of radius

In 1875 he examined 20 trees in the Sidli forests Goalpára district,

In 1876 he examined 11 trees in the same forests 4 trees of 4 feet 6 inches girth gave 76 rings, or 8 8 rings per inch of radius, 7 trees of 3 feet girth gave 51 rings, or 8 8 rings per inch

In 1877 he examined 17 tr
rings or 9 rings per inch of ra
rings per inch of radius, 13
inch of radius, and 2 trees of

The rings were counted in t
counting of the rings was as follows —

Locality	Number of trees	Rings counted on a length of radius from centre, corresponding to a girth (wood only) of			
		18	36	54"	72"
Pantan (on the hill)	[illegible]2	30	56	82	115
(in the plains)	18	32	65	96	146
Balipara	32	38	61	9[illegible]	116
Sidli 1875	20	[illegible]8	52	69	
" 1876	11	[illegible]6	51	[illegible]8	
" 1877	17	26	51	[illegible]2	90
	120	30	56	83	112

On an average the number of rings per inch of radius is 10, and it will be noticed that the annual increments are exceedingly uniform. A tree grows:—

up to 18 inches girth (wood only) in 30 years.
from 18 to 36 „ „ „ in 26 „
„ 36 to 54 „ „ „ in 27 „
„ 54 to 72 „ „ „ in 20 „ .

In the Oudh forests a different result has been obtained. When the first proposals were made in 1863 to regulate the working of the forests of the Kheri division, the following was assumed as the mean rate of growth:—

Girth 18 inches, age 15 years.
„ 54 „ „ 50 „
„ 72 „ „ 80 „

Subsequent data seeming to indicate a somewhat slower rate, it was estimated in 1868, in order to settle the number of trees to be cut over in 1868 and 1869, that a girth of 54 inches would be attained in 65 years, and a girth of 72 inches in 95 years.

In September 1869, Mr. Forrest examined 50 logs cut in the Newal Khar subdivision of the Kheri forests; these logs had a mean girth of 5 feet 3 inches and gave on an average 4·79 rings per inch of radius. Again in 1877 a sál tree about 16 or 17 years old was examined by Captain Wood, and at 1 foot from the base, where the girth was 1 foot 10 inches, it was found that an inch of radius contained 4·80 rings. Thus, supposing we take 5 rings to the inch as indicating the average rate of growth, the trees examined in Oudh would have attained a girth of 6 feet in 57 years, which, it will be seen, is about one-half the time which the trees examined by Mr. Fisher in the Dúars required to attain the same size.

In the Central Provinces the counting of rings has given a mean between Bengal and Oudh. In 1867, Captain Douglas examined 13 stumps in the Bijeragogarh forests; their mean girth at 17 inches from the ground was 5 feet 3 inches, and the average number of rings per inch of radius was 6·5. In 1874 Mr. Fernandez examined a single stump in the same forests, and 7·2 rings were counted per inch of radius. The mean of the results of these countings is 6·85 rings per inch, which would place the age of a tree 6 feet in girth at 78 years. Subsequent observations in the Banjar Valley forest, Mandla district, give a mean of 5 to 8 rings per inch and tend to confirm this rate of growth.

The following cultivated trees of known age were measured by Mr. Brandis in 1863;

Saharanpur, and Eastern Jumna Canal 13 years, girth 27 inches (average of 33 trees).
„ „ „ 30 „ „ 54½ „
„ „ „ 35 „ „ 79½ „
Calcutta . . . . . 25 „ „ 69 „ (one tree).

The weight of a cubic foot of seasoned wood is generally found to vary between 50 and 60 lbs. The average of the experiments recorded below is 59 lbs., but while Baker's experiments (85) give an average of 61·6 lbs., Brandis' experiments (114) give only 53·6 lbs. as the average. The average of the 13 specimens weighed in 1878, omitting the last, is 59 lbs., but this includes unseasoned or only partially seasoned wood; the average weight of the Garhwal (O 204) and Mandla (C 173) specimens, which were thoroughly seasoned, is 51 lbs. Clifford gives 55 lbs. as the weight of sál when perfectly dry; 54 to 55 lbs. may therefore be considered as the average weight of seasoned sál.

The transverse strength has been tested by numerous experiments. The value of P as determined by Brandis, Baker and others, ranges from 648 to 939, the mean value being 790. The following abstract shews the results of all the best experiments on this timber.

Exper ment by whom condu ted	Year	Wood whence procured	No of ex per men s	S ze of bar	Weight	Va ne of P
				Ft Ins Ins		
Brand s	1864	Bengal (Morung)	28	6 × 2 × 2	57	806
		"	8	6 2 1½	56	817
		"	20	2 1 1	50	745
"	1865 66		11	3 1 1	50	916
		"	14	2 1 ¾	40	80?
		(Durbhunga)	13	6 2 2	61	708
		"	12	6 2 1½	54	91
	"	"	8	3 1 1	56	884
Baker	18 9	(Morung)	31	7 2 2	59	78
			64	6 2 2	64	792
"			24	3 1 1½		803
			6	7 2 2		8 9
"		Bengal	9	7 2 2	61	717
	"		3	3 1½ 1		803
			18	2 1 1		8 3
"	"	Go akhpur	10	6 2 2	62	816
"		P bhit	6	7 2 2	63	692
Campbell	1631	Morung (seasoned)	4	6 2 2	55	8 0
	"	(unseasoned)	4	6 2 2	66	862
	"	Gorakl pur	1	6 2 2	65	884
Skinner No 13?	1862	Nortl ern India			55	880
Kyd	1831	Morung	1	2 1 1	54	820
Cunningham	1854	Gwalior	3	2 1 1	65	1 097
Wa h		India and Nepal	3		47	
Smythies	18 8	Many localities (See l st)	13		59	

The follow ng s a summary of Mr Clifford s remarks about sal in his Memorandum on the Timber of Bengal

The
and spl t
avidity n

with
w th
can
ous
of
wood s l when once thoroughly seasoned stands almost without a rival as a
it retains without being

Mr Clifford in the
sal brought to Calcu
they are known as 'Mor ing and 'Durbhunga one from the forests to the ea of
the Coos the other from the forests to the west. The Morung sal is the best, it is

very straight-grained, clean and free from knots; it seasons more kindly, and is stronger than the Durbhungah sál; only a practised eye can distinguish one sál from the other." Many of these supposed varieties, however, exist in imagination only, *e.g.*, the two Buxa pieces E 3137 and E 3138, the Nepalese sawyers say that one is a softer and redder wood than the other, but we can distinguish no such difference between them.

Sál is the timber which in Northern India is the most extensively used. It is in constant request for piles, beams, planking and railing of bridges; for beams, door and window-posts of houses; for gun-carriages; the body of carts (not the wheels, for which it is unsuited and for which sissú or even saj is better); and above all, for railway sleepers, the yearly consumption of which reaches some lakhs of cubic feet. It is used in the hills of Northern Bengal, where it is found, perhaps, of the largest size now available, for making canoes. Owing to its not being floatable, difficulty is experienced in most sál forests in getting the timber out of the forests in log. The difficulty is, however, partially overcome by floating the logs either with the assistance of boats or with floats of bamboos or light woods, such as semul (*Bombax malabaricum*).

When tapped, the tree exudes large quantities of a whitish, aromatic, transparent resin (*lál dhúna*), which is collected and sold. It is used to caulk boats and ships and as incense. "In some places in the Upper Tista forests, large pieces, often 30 to 40 cubic inches in size, are found in the ground at the foot of the trees."—*Gamble.* Large extents of forest, chiefly in Central India, such as Chota Nagpore, the Central Provinces and the country between the Mahanadi and Godavari, are often ruined by this practice of tapping the trees to obtain the resin. The seed is eaten by the Sonthals, especially in time of scarcity, it is roasted and is usually eaten mixed with the flowers of the Mohwa (*Bassia latifolia*).

Scarcely any tree of the Indian forests has such a power of natural reproduction as sál. The seed ripens at the commencement of the rains; and often germinating even while yet on the tree, the heavy seed is scattered around and at once produces a crop of seedlings. Without light, however, these seedlings soon die off, so that cuttings in sál forest where fire protection is assured, might be heavy. But, usually, scarcely have the seedlings reached one year in age when they are destroyed by jungle fires, but so great is the vitality of the plant, that the roots of the stems destroyed again at once put out fresh shoots, and this happens often year after year, so that at the root of the tree a large hard ball of wood and bark is formed. With fire-protection, however, the regeneration of sál forests is almost a certainty; the seedlings in a few years kill down the grass and plants of slower growth which surround them, and form forests, often of very considerable extent, almost to the exclusion of other species of tree. The sál tree coppices, especially when young, but not under all circumstances.

			lbs.
O	204.	Garhwal (1868)	53
O	2990.	„ (1874)	59
O	873.	Ramganga Valley, Kumaun, 1,800 ft.	69
O	388.	Oudh	60
O	1215.	„	59
O	2980.	„ (section of fire-damaged tree)	...
O	1210. 1211.	„ (sapling sections)	...
O	1213.	„ (sections of shoot)	...
O	1214.	„ (butt ends)	...
C	173.	Mandla, C. P. (1871)	49
C	1235.	Gumsúr, Madras	64
E	497.	Sukna Hills, Darjeeling, 1,500 ft.	58
E	702.	Tista Valley „ „ „	64
E	2322.	Darjeeling Terai	54
E	3137.	Buxa Reserve, Western Dúars	62
E	3138.	„ „ „ „	61
E	635.	Eastern Dúars, Assam	53
E	1440.	Mishmi Hills (Griffith, 1836)	47

(The identification of this last specimen is doubtful; the pores are not filled with resin, and the medullary rays are finer and more numerous than in sál.)

4 S obtusa, Wall, Hook Fl Ind i 306, Kurz i 118 Vern *Thitya*, Burm

A large tree Bark ½ inch thick, grey, with deep longitudinal fissures Heartwood the colour of sal, very hard and durable Pores moderate to large, often filled with resin, each pore surrounded by a narrow white ring Medullary rays moderately broad to broad, numerous, joined by short irregular transverse bars or lines of lighter coloured tissue The wood of this tree is more even grained than that of either sal or *engyin*

Eng forests of Burma
Weight accord of 1862
No 17 gives 57 lbs Sl i ner
g ves P = 730 is used for
canoes and in building and is valuable for tool handles and planes

			lbs
B	555	Prome Burma	64
B	556		67
B	2973		52
B	283	Burma (1867)	56

5 S Tumbuggaia, Roxb Fl Ind ii 617, Hook Fl Ind i 306, Beddome xxvi, t 5 *Vatica Tumbuggaia*, W and A Vern *Cangu, congo, tambugai, tambagum*, Tam, *Thamba, googgilapu karra*, Tel, *Vanboga*, Mal

A large tree Wood smooth, harder than that of sál but similar in structure Medullary rays shorter and somewhat unequal Concentric lines more numerous and more distinctly marked

s
y
e
r

			lbs
D	1062	Cuddapah	66
D	1078	North Arcot	68

6 S siamensis, Miq, Hook Fl Ind i 304 *Pentacme siamensis*, Kurz i 119 Vern *Engyin*, Burm

A large deciduous tree Bark ½ inch thick, dark grey, with deep vertical fissures Heartwood very hard, very heavy and cross grained, in this respect similar to sal, which it also resembles in colour Pores moderate sized, rarely large, sometimes in groups and filled with resin, enclosed in narrow white rings and joined by fine, wavy, concentric lines Medullary rays fine, numerous, equidistant

Eng forests of Burma
Weight Brandis Burma List of 1862 No 16 gives 55 lbs our specimens average 54 lbs The wood is much prized on account of its durability, it is used for house building bo a and other purposes It gives a red res n

			lbs
B	2507	Burma (1862)	48
B	3127	Kya-eng Attaran Valley, Burma	60
B	2512	Prome Burma	16

4 HOPEA, Roxb

Large glabrous or hoary to mentose resinous trees Eight species of which 5 are South Indian and 3 Burmese *H longifolia* Dyer, Hook Fl Ind i 309 (*H pa*

flora, Beddome xxvii., *in part*) is a large tree of Tinnevelly. *H. Wightiana*, Wall.; Hook. Fl. Ind. i. 309; Beddome t. 96. Vern. *Kalbow*, *kiralboghi*, Kan.; *Kong*, Tinnevelly, is a large tree of the Western Gháts often forming coppice woods and yielding a good timber. *H. glabra*, W. and A.; Hook. Fl. Ind. i. 309 (*H. Wightiana*, Beddome t. 96, *in part*), is a tree of South India; and *H. racophlæa*, Dyer (*Hopea* sp., Beddome xxvii) is a tree of the Wynaad with hard, heavy, durable timber. *H. oblongifolia*, Dyer; Hook. Fl. Ind. i. 309; Kurz i. 121, and *H. Griffithii*, Kurz i. 122; Hook. Fl. Ind. i. 310, are trees of Tenasserim.

Heartwood yellowish brown, hard, smooth, even-grained; seasons well.

1. H. odorata, Roxb. Fl. Ind. ii. 609; Hook. Fl. Ind. i. 308; Kurz i. 120. *H. eglandulosa*, Roxb. Fl. Ind. ii. 611. Vern. *Thingan*, Burm.; *Ríadá*, And.

A large evergreen tree. Bark ½ inch thick, dark, with deep longitudinal furrows. Wood yellow or yellowish brown, hard, close and even-grained. Pores moderate-sized and large, less numerous than in sál. Medullary rays short, moderately broad, with a few intermediate fine rays, very prominent, joined by numerous white transverse lines. The rays are visible on a radial section as long straight bands, giving the wood a beautifully mottled appearance.

Eastern moist zone. Scattered in evergreen forests of British Burma and the Andaman Islands.

The weight and transverse strength have been determined by the following experiments :—

					Weight.	Value of P.
Baker	in 1829, 4 experiments with	Tavoy	wood 7' × 2" × 2" gave	.	51 lbs.	839
Skinner	in 1862, No. 80, ...	Burma	„ ... ... „	.	45 „	706
Bennett	in 1872, No. 5, „ „	Andaman	„ ... ... „	.	63 „	737
Wallich	... ... „ „	Martaban	„ ... ... „	.	39 „	...
Brandis	in 1863, No. 11, „	Burma	„ ... ... „	.	16 „	...
Smythies	in 1878, 8 „ „	„	and Andaman wood „	.	60 „	...

Very durable, *e.g.*, the specimens brought by Wallich from Tavoy in 1828, which, though now 50 years old, are perfectly sound and good. Boats made of it are said to last 20 years. It is the chief timber tree of Southern Tenasserim. It is used for house-building and canoes; also considered good for solid cart wheels. It gives a yellow resin, which, according to Major Protheroe, is used by the Andamanese, mixed with beeswax and red ochre, to make a wax used to fasten their spear and arrow-heads.

			lbs.
B	282.	Burma (1867)	44
B	285.	„ „	...
B	546.	Martaban	53
B	2509.	Burma (1862)	43
B	2698.	Tavoy (Wallich, 1828)	52
B	2714.	„ „ „	49
B	2716.	„ „ „	56
B	511.	Andaman Islands	51
B	2201.	„ „ (Major Ford, 1866)	54

2. H. parviflora, Beddome t. 7. Hook. Fl. Ind. i. 308. Vern. *Kiral boghi*, *tirpu*, Kan.; *Irubogam*, Malabar.

A large tree. Wood brown, hard and close-grained. Pores small and moderate-sized, numerous. Medullary rays moderately broad, prominent, generally bent where they touch the pores, uniform and equidistant.

Western moist zone. Malabar and South Kanara, up to 3,500 ft.
Weight, 62 to 63 lbs.

The wood is of good quality though scarcely known it is valued in South Kanara or building temples and may be found useful for sleepers

		lbs
W 715	South Kanara	62
W 759	„	63

5 VATERIA, Linn

Only one species is indigenous in India, though fourteen are described from Ceylon

1 V indica, Linn , Hook Fl Ind i 313, Roxb Fl Ind ii 602 *V malabarica,* Blume, Beddome t 84 The Piney Varnish or Indian Copal Tree Vern *Piney maram, dhup maram, vallay kungiliam, ondricam,* Tamil, *Dupa maram, dhupa, paini, munda dhup,* Kan , *Dupada,* Tel , *Payani, paini mara, vella kondrikam* Mal , *Hal,* Cingh

A large evergreen tree, bark whitish. Sapwood white with a tinge of red , heartwood grey, rough, moderately hard, porous Pores small and moderate sized, often in groups Medullary rays fine and broad, very prominent on all vertical sections, while on a radial section they appear as rough plates with white shining fibres between them The distance between the broad rays is generally greater than the transverse diameter of the pores

Western moist zone Western Ghats from Kanara to Travancore ascending to 400r

coffins and the masts

		lbs
W 747	South Kanara	41
W 1187	„	41

6 DOONA, Thwaites

A genus of Ceylon trees 10 species

1. D. zeylanica, Thwaites Enum 34, Hook Fl Ind i 311, Beddome t 97 Vern *Doon,* Cingh

A large tree Bark rough and cracked Heartwood the colour of al, moderately hard Pores large, often subdivided Medullary rays fine, uniform and equidistant, the distance between the rays less than the transverse diameter of the pores

housebuilding The tree ved in spirits of wine or

	lbs
No 25, Ceylon Collection	29

Order XVII MALVACEÆ

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he coast of Sind being indigenous in India.

The ten genera belong to two Tribes, *viz.*:—

Tribe I.—Hibisceæ . . . *Decaschistia, Dicellostyles, Hibiscus* and *Thespesia.*
„ II.—Bombaceæ . . . *Kydia, Adansonia, Bombax, Eriodendron, Cullenia* and *Durio.*

Decaschistia contains 2 shrubs of Southern India. *Dicellostyles jujubifolia* Benth.; Hook. Fl. Ind. i. 333; Gamble 10. Vern. *Kubindé,* Nep.; *Dantaglar,* Lepcha is a small white-flowered tree of the hills of Sikkim and Bhutan. *Adansonia digitata,* Linn.; Hook. Fl. Ind. i. 348; Roxb. Fl. Ind. iii. 164; Beddome xxix; Brandis 30, the Baobab Tree. Vern. *Gorak imli,* Hind.; *Kalp briksh,* Ajmere, Delhi; *Paparapulia,* Tam., was introduced from tropical Africa and is now cultivated here and there, chiefly in South India and Bengal, but occasionally as far north as Gurgaon (see 'Indian Forester,' Vol. iv. i. p. 102, for description of a tree at Tilpat, measuring 22 feet in girth and rising 50 feet to the first branch). Brandis mentions 3 trees at Deogarh in the Central Provinces, respectively measuring 16, 22 and 40 feet in girth, and there are one or two good-sized trees at Calcutta and Barrackpore. It is being experimentally planted at Calcutta and in the Sundarbans; as, were it capable of easy cultivation, its rapid growth, valuable fibre and fruit would make the extension of its growth desirable; as yet, however, it has not succeeded. *Eriodendron anfractuosum,* DC.; Hook. Fl. Ind. i. 350; Beddome xxx. (*E. orientale,* Steud.; Kurz i. 131. *Bombax pentandrum,* Roxb. Fl. Ind. iii. 165) the White Cotton Tree. Vern. *Safed simal, senibal, hatian, katan,* Hind.; *Shwet simúl,* Beng.; *Ilavam,* Tam.; *Buruga, pur, kadami,* Tel.; *Shamieula,* Mar.; *Pania,* Mal.; *Imbúl,* Cingh., is a tall deciduous soft-wooded tree of India and Burma, often planted. Skinner, No. 67, gives its weight as 30 lbs., and P = 400. *Cullenia excelsa,* Wight; Hook. Fl. Ind. i. 350; Beddome xxx. Vern. *Malai-konji, aini-pillao,* Tam.; *Kattu-bodde,* Cingh., is a tall white-wooded tree of the Western Ghâts and Ceylon, having a large globose, spiny fruit. *Durio Zibethinus,* DC.; Hook. Fl. Ind. i. 351; Roxb. Fl. Ind. iii. 399; Kurz i. 132. Vern. *Duyin,* Burm.; *Durian,* Malay, is the well known and much prized fruit tree, yielding the Durian or Civet-Cat fruit. It is wild in South Tenasserim, but is cultivated as far north as Moulmein.

Wood generally soft, a few species with small dark coloured heartwood. Pores moderate-sized to large. Medullary rays fine or moderately broad. *Kydia calycina* and *Hibiscus syriacus* have transverse bars across the rays.

1. HIBISCUS, Medik.

A genus of herbs, shrubs, climbers or small trees. The 9 Indian woody species consist of 2 small trees, 2 shrubs, 1 climber and 5 introduced garden shrubs. *H. fragrans,* Roxb. Fl. Ind. iii. 195. Vern. *Kinúrlur,* Beng., is a small tree of Assam and Cachar. *H. macrophyllus,* Roxb.; Kurz i. 126 (*H. setosus,* Roxb. Fl. Ind. iii. 194) Vern. *Kachia udal, kasyapála* Beng.; *Sho, dayban,* Magh; *Yetwoon,* Burm. (Weight, 27 to 28 lbs. per cubic foot, according to Wallich) a small handsome, large-leaved tree of Eastern Bengal, Chittagong and Burma, said by Kurz to have a rather heavy wood, and to give a good rope-making fibre. *H. scandens,* Roxb. Fl. Ind. iii. 200; Kurz i. 127; Gamble 10, is a large climbing shrub of Eastern Bengal from Sikkim to Chittagong; and *H. collinus,* Roxb. Fl. Ind. iii. 198. Vern. *Kandagang,* Tel., a large shrub of the Eastern Madras coast. *H. rosa-sinensis,* Linn., the Shoe Plant. Vern. *Juwa, oru,* Beng.; *Khoungyan,* Burm. with brilliant, large, red flowers; *H. tricuspis,* Banks; *H. mutabilis,* Linn.; and *H. syriacus,* Linn. Vern. *Gurhul,* are all shrubs which have been introduced and are now cultivated in gardens.

1. **H. tiliaceus,** Linn.; Hook Fl. Ind. i. 343; Roxb. Fl. Ind. iii. 192; Beddome xxix; Kurz. i. 126. Vern. *Bola, chelwá,* Beng.; *Thengben, thimban,* Burm.; *Beligobel, bellipatta,* Cingh.
Pores very numerous, small- and moderate-sized, often subdivided. Medullary rays fine and moderately broad, not very prominent.

Coasts of India, Burma and Ceylon.
Weight, 35 to 38 lbs. per cubic foot.

The wood is not used, except as fuel. It gives a fibre which is very extensively used in Bengal for rough ropes

		lbs
E 405	Sundarbans	35
No 7	Ceylon Collection (marked *Paritium tiliaceum*)	38

2 THESPESIA, Corr.

Two species *T Lampas*, Dalz and Gibs, Hook Fl Ind i 345 Kurz i 128, Gamble 10 (*Hibiscus Lampas* and *tetralocularis*, Roxb Fl Ind iii 197, 198) Vern *Bonkapash*, Ass (Wallich), *Kondapatti*, Tel, is a shrub found in most parts of India, whose wood, according to Kyd, weighs 29 lbs and P = 407

1 T populnea, Corr, Hook Fl Ind i 345, Beddome t 63, Kurz i 128 *Hibiscus populneus*, Willd, Roxb Fl Ind iii 190 The Portia Tree or Tulip Tree Vern *Parsipu*, Hind, *Poresh*, *parash*, Beng, *Poris*, *purasa*, *portia*, *pursa*, *pursung*, *puvarasam*, Tam, *Gangaraya*, Tel, *Bendi*, Guz, Mar, *Sureya*, Cingh

A moderate sized evergreen tree Sapwood soft, wood pale reddish, with small, dark coloured, hard heartwood Pores moderate sized, scanty, subdivided, uniformly distributed Medullary rays fine, uniform, the distance between two rays generally equal to the transverse diameter of the pores

Coast forests of India Burma and the Andaman Islands Planted throughout India

Weight Skinner No 130, and A Mendis give 49 lbs, our specimens give 50 lbs Skinner giv
Wood carriage
making and - good fibre
from the bark and a yellow dye from the capsules

		lbs
C 1050	Guzerat	50
E 2488	Calcutta	
B 2470	Andaman Islands (Kurz, 1866)	
No 51	Salem Collection	53
No 28	Salem Collection (marked *Eugenia caryophyllæfolia*)	48
No 80	Ceylon Collection	49

3 KYDIA, Roxb

Besides the species described below, *K glabrescens*, Mast, Hook Fl Ind i. 348, is a tree of Bhutan and Assam

1. K calycina, Roxb, Hook Fl Ind i 348, Beddome xxviii; Brandis 29, Kurz i 124, Gamble 10 *K calycina* and *fraterna*, Roxb Fl Ind iii 188, 189 Vern *Pola*, *pula*, *púli patha*, *potari*, Hind, *Barranga*, *bhoti*, C P, *Kubindé*, Nep, *Sedangtaglar*, Lepcha, *Mahow*, Mechi, *Boldobak*, Gáro, *Kopasia*, Uriya, *Potri*, *pandiki*, *peddapotri*, *pedda kunji*, Tel, *Buruk*, *bosha*, Gondi, *Bendi*, Kan, *Warung*, Mar, *Dwabote*, Burm

A small tree Bark ¼ inch thick, grey, peels off in irregular flakes. Wood white, soft, no heartwood Annual rings marked by white concentric lines Pores scanty, moderate sized, often oval and subdivided. Medullary rays short, fine to broad, numerous, joined by white transverse bars, and in this respect resembling Anonaceæ, on a radial section distinctly visible as long straight bands

Common in the forests of all parts of India and Burma, except the arid region. Growth fast, 4 to 8 rings per inch of radius

Weight. 40 to 45 lbs. per cubic foot according to Brandis [illegible] as an average. The wood is used for house-building, ploughs and oars, and [illegible]. The inner bark gives a fibre.

C 1177.	[illegible] Reserve, Central Provinces	[illegible]
C 1163.	[illegible]	[illegible]
C 3154.	[illegible]	[illegible]

4. BOMBAX, Linn.

1. B. malabaricum, [illegible]; Beddome t. 82; Brandis [illegible] B. heptaphyllum, Cav.; Roxb. Fl. [illegible] Simal, [illegible] Shirlus, Sutlej; [illegible] Beng.; [illegible] Uriya; Bolchú, [illegible] Tel.; [illegible] palá, Tam.; [illegible] Kasseri, [illegible] Magh; [illegible]

A [illegible] tree, with branches in whorls, spreading horizontally, [illegible]. Bark grey, when young with [illegible] irregular, [illegible] expo[illegible]

[illegible]

[illegible] Brandis, For. [illegible] lbs. the average [illegible] lighter than the [illegible] (Cunning[illegible]) [illegible] well; [illegible] fishing boats, [illegible] Burma the trunk is often hollowed out [illegible] native medicine, regarding which Capt. [illegible] gum commences in March and [illegible] per seer, and is used [illegible] which surrounds [illegible]

[illegible] seeds very freely every year [illegible] rapidly. It is easily reproduced [illegible]

[illegible] Central Provinces (1871).

[illegible] Darjeeling Terai

[illegible] Assam

Weight, 31 lbs per cubic foot The wood is more durable than that of *B malabaricum*, the specimen from the Andamans had been 12 years in Calcutta in the rough, and was only slightly discoloured on being cut up

		lbs
B 2215	Andaman Islands (Major Ford, 1866)	31

Order XVIII. STERCULIACEÆ

An Order containing 15 Indian genera of herbs, shrubs, climbers or trees Of these genera, three are herbs or (*Melhania*) undershrubs, and the rest shrubs, erect or climbing, and trees The Order is divided into 6 Tribes, *viz* —

Tribe	I —Sterculieæ	*Sterculia* and *Heritiera*
„	II —Helictereæ	*Reevesia, Kleinhovia, Helicteres* and *Pterospermum.*
„	III —Eriolæneæ	*Eriolæna*
„	IV —Dombeyeæ	*Melhania*
„	V —Hermannieæ	*Melochia*
„	VI —Buettnerieæ	*Abroma, Guazuma, Buettneria* and *Leptonychia*

Of the genera not here described, *Reevesia* contains two small trees *R Wallichii*, Br and *R pubescens*, Mast., Hook Fl Ind i 364, Gamble 11, of Sikkim and the Khasia Hills *Kleinhovia Hospita*, Linn , Hook Fl Ind i 364, Roxb Fl Ind iii

regions of

a, Beddome

lsewhere in

India *Abroma augusta* Linn Hook Fl Ind i 375, Roxb Fl Ind iii 156,

belongs to this family, and has been grown in some parts of India and in Ceylon

The genera of this family have little in common as regards the structure of their wood The species of *Sterculia* have a very soft and light wood, that of *Heritiera* being very hard and heavy, while the wood of *Eriolæna* and *Pterospermum* is intermediate between the two.

1. STERCULIA, Linn.

S fœtida, Linn , Hook Fl Ind i 354, Roxb Fl Ind iii 155, Beddome xxxi, Kurz i 135 Vern *Jangli badam*, Hind , *Pinari*, Tam , *Gurapu badam*, Tel , *Hlyai*

with a

lbs a

i, 355

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Fl In

Balai

138)

Roxb

II

Burm ,

The wood is generally light, soft, often spongy, with large pores and moderately broad or broad medullary rays, which are very prominent on a radial section.

1. **S. urens**, Roxb. Fl. Ind. iii. 145; Hook. Fl. Ind. i. 355; Beddome xxxii; Brandis 33; Kurz i. 135. Vern. *Gúlú, kúlú, gular, tabsi, tanuku, karrai*, Hind.; *Odla, hatchanda*, Ass.; *Tabsu*, Tel.; *Vellay pútali*, Tam.; *Hittúm, pinoh*, Gondi; *Takli*, Kurku; *Karai, kandol, gwira*, Mar.; *Kalru*, Ajmere; *Kalauri*, Panch Mehals.

A large deciduous tree. Bark ½ inch thick, very smooth, white or greenish grey, exfoliating in large thin irregular plates. Wood very soft, reddish brown with an unpleasant smell, with lighter coloured sap-wood. Prominent and regular concentric lines, which may possibly be annual rings. Pores large, often oval and subdivided, frequently filled with gum. Medullary rays moderately broad, on a radial section prominent as long, dark, undulating bands, giving the wood a mottled and reticulate appearance; the distance between the rays is larger than the transverse diameter of the pores.

Sub-Himalayan tract from the Ganges eastwards, Southern India and Burma.

Weight, about 42 lbs. per cubic foot; Kyd gives for Assam wood: Weight 18 lbs., P = 103, but it seems probable that Kyd's specimen was not this, but *S. villosa*.

Wood used to make native guitars and toys. It yields a gum called '*Katila*' or '*Katira*.' The seeds are roasted and eaten by Gonds and Kurkus in the Central Provinces. Its bark gives a good fibre, and fine specimens of it from Berar were sent to the Paris Exhibition of 1878 (C. 984 from Bairagarh Reserve, Melghát.)

			lbs.
P	471.	Ajmere	35
P	3220.	Nagpahar, Ajmere	...
C	1102.	Ahiri, Central Provinces	39
D	1088.	Madura, Madras	51

2. **S. villosa**, Roxb. Fl. Ind. iii. 153; Hook. Fl. Ind. i. 355; Beddome xxxii; Brandis 32; Kurz i. 136; Gamble 10. Vern. *Poshwa*, Sutlej; *Udal, udar*, Hind.; *Gul-bodla, gul-kandar, massu*, Punjab; *Kanhlyem*, Lepcha; *Kúdar, baringa*, Gondi; *Buti*, Kurku; *Omak, odela, salua*, Ass.; *Udare*, Gáro; *Vake nar, arni, ani-nar*, Tam.; *Sambeing*, Magh.

A moderate-sized tree. Bark grey or brown. Wood grey, very soft, spongy. Annual rings prominent. Pores large, often sub-divided. Medullary rays moderately broad, harder than the white spongy tissue between them, joined by numerous transverse bars. On a radial section the pores and medullary rays are distinctly visible, giving the wood a reticulate and mottled appearance.

Sub-Himalayan tract from the Indus eastwards; common in forests throughout India and Burma.

Growth fast, 3 to 6 rings per inch of radius. Weight, 15 to 22 lbs. per cubic foot. Wood not used. The tree is valuable on account of its fibre, which is coarse but strong. It is made into ropes and coarse bags, and in Bengal, Burma and South India into ropes and breastbands for dragging timber. Specimens were sent to the Paris Exhibition of 1878 from many provinces, but especially from Bengal and from Berar (C 986, for Bairagarh Reserve, Melghát). It gives a white pellucid gum which exudes copiously from cuts in the bark. It coppices freely, and is extremely difficult to extirpate in clearings.

			lbs.
E	2324.	Sivoke, Darjeeling Terai	22
E	620.	Bamunpokri, Darjeeling Terai	15
W	847.	South Kanara	20

3 S coccinea, Roxb Fl Ind iii 151, Hook Fl Ind i 357, Kurz i 137, Gamble 11 Vern *Sitto udal,* Nep, *Katior,* Lepcha

A small evergreen tree, with smooth, light grey bark Wood grey, spongy, extremely soft Structure similar to that of *S urens* Transverse bars distinct

Eastern Himalaya ascending to 6 000 feet Assam, Khasia Hills hills of Burma

Weight 17 lbs per cubic foot

Bark used for the same purposes as that of *S villosa* but less commonly

		lbs
E 573	Khooklong Forest Darjeeling Terai	17

4 S colorata, Roxb Fl Ind iii 146, Hook Fl Ind i 359, Beddome xxxii, Bran lis 34, Kurz i 138, Gamble 11 Vern *Bodula, walena, samarri,* Hind, *Moola,* Beng, *Sitto udal, phirphiri omra,* Nep, *Kanhlyem,* Lepcha, *Bola ong,* Garo, *Khowsey, pinj,* Berar, *Bhai koi,* Bombay, *Karaka,* Tel, *Wet shaw,* Burm, *Berda,* And

A moderate sized tree Bark grey Wood grey, very soft Structure similar to that of *S urens,* but medullary rays broader and shorter, and transverse bars distinct

Sub Himalayan tract from the Jumna eastwards Central and South India Burma and the Andaman Islands

radius Weight 24 lbs per cubic foot
ecimens of the fibre were sent from Berar to
airagarh Reserve Melghat)

		lbs.
E 1394	Chittagong	24

2 HERITIERA Blume

Contains 3 Indian trees of which 2 are here described They have simple leaves scaly beneath or silvery white Besides the two here described *H Fomes* Buch Hook Fl Ind, i 363 (*H minor* Roxb Fl Ind iii 142 Kurz i 141) is a tr e of Sylhet Chittagong Arracan and the deltas of the Ganges and Irrawaddy It has a red brown strong wood weighing 66 lbs per cubic foot and used for boats, bridges and house building

Heartwood red very hard Numerous transverse bars between the medullary rays

1 H littoralis, Dryand, Hook Fl Ind i 363, Roxb Fl Ind iii 142, Beddome xxxiii, Kurz i 140 Vern *Sunder, sundri,* Beng, *Penglai kanazo,* Burm, *Uawtda,* And

A small gregarious evergreen tree Bark dark grey, with longitudinal cracks Sapwood white, heartwood dark red, very hard, close-grained Pores moderate sized to large, often oval and subdivided into compartments Medullary rays uniform, moderately broad, short, wavy, with numerous, very fine, white, transverse bars, the distance between two rays being generally equal to the transverse diameter of the pores

Coasts and tidal forests of Bengal the Peninsula, Burma and the Andaman Islands

Weight as much as 104 lbs when wet according to Schlich The weight of seasoned wood as well as the value of P, have been determined by the following

The wood is generally light, soft. o moderately broad or broad medullary ra a radial section.

1. S. urens, Roxb. Fl. Ind. iii. 145; xxxii; Brandis 33; Kurz i. 135. Vern. (*karrai*, Hind.; *Odla, hatchanda*, Ass.; ' *Hittúm, pinoh*, Gondi; *Takli*, Kurku; *Kalru*, Ajmere; *Kalauri*, Panch Mehals.

A large deciduous tree. Bark ½ in greenish grey, exfoliating in large thin soft, reddish brown with an unpleasant s wood. Prominent and regular concent be annual rings. Pores large, often ov filled with gum. Medullary rays moder prominent as long, dark, undulating ba and reticulate appearance; the distance the transverse diameter of the pores.

Sub-Himalayan tract from the Ganges eastw

Weight, about 42 lbs. per cubic foot; Kyd gi P = 103, but it seems probable that Kyd's speci

Wood used to make native guitars and toys '*Katira*.' The seeds are roasted and eaten by G vinces. Its bark gives a good fibre, and fine spec the Paris Exhibition of 1878 (C. 984 from Bairag

P 471.	Ajmere	. . . . . .
P 3220	Nagpahar, Ajmere	. . .
C 1102.	Ahiri, Central Provinces	. .
D 1088.	Madura, Madras	. . .

2. S. villosa, Roxb. Fl. Ind. iii. 153; xxxii; Brandis 32; Kurz i. 136; Gamb *Udal, udar*, Hind.; *Gul-bodla, gul-kand* Lepcha; *Kúdar, baringa*, Gondi; *Buti*, Ass.; *Udare*, Gáro; *Vake nar, arni, ani-n*

A moderate-sized tree. Bark grey soft, spongy. Annual rings prominen divided. Medullary rays moderately br spongy tissue between them, joined by nu radial section the pores and medullary ray the wood a reticulate and mottled appeara

Sub-Himalayan tract from the Indus eas India and Burma.

Growth fast, 3 to 6 rings per inch of radius. Wood not used. The tree is valuable on account It is made into ropes and coarse bags, and in P and breastbands for dragging timber. Specimens 1878 from many provinces, but especially from Bairagarh Reserve, Melghát). It gives a white from cuts in the bark. It coppices freely, and clearings.

E 2324.	Sivoke, Darjeeling Terai	.
E 620.	Bamunpokri, Darjeeling Terai	
W 847.	South Kanara	. . . .

3. S coccinea, Roxb Fl. Ind. iii. 151; Hook. Fl Ind i 357; Kurz i 137, Gamble 11. Vern *Sitto udal,* Nep., *Kaltor,* Lepcha

A small evergreen tree, with smooth, light grey bark. Wood grey, spongy, extremely soft Structure similar to that of *S. urens.* Transverse bars distinct.

Eastern Himalaya, ascending to 6,000 feet, Assam, Khasia Hills, hills of Burma

Weight, 17 lbs per cubic foot

Bark used for the same purposes as that of *S villosa,* but less commonly

		lbs
E 673	Khooklong Forest, Darjeeling Terai	17

4 S colorata, Roxb Fl. Ind. iii 146, Hook Fl Ind i. 359; Beddome xxxii, Brandis 34, Kurz i 138, Gamble 11. Vern. *Bodula, walena, samarri,* Hind., *Moola,* Beng, *Sitto udal, phirphiri, omra,* Nep, *Kanhlyem,* Lepcha, *Bolazong,* Garo, *Khowsey, piny,* Berar, *Bhái-koi,* Bombay, *Karaká,* Tel, *Wet-shaw,* Burm, *Beidá,* And.

A moderate-sized tree Bark grey Wood grey, very soft. Structure similar to that of *S urens,* but medullary rays broader and shorter, and transverse bars distinct.

Sub-Himalayan tract from the Jumna eastwards, Central and South India, Burma and the Andaman Islands.

Growth fast, 3 to 4 rings per inch of radius Weight, 24 lbs per cubic foot

Bark used in rope making Fine specimens of the fibre were sent from Berar to the Paris Exhibition of 1878 (C 985 Bairagarh Reserve, Melghat)

		lbs
E 1394.	Chittagong	24

2 HERITIERA, Blume.

Contains 3 Indian trees, of which 2 are here described. They have simple leaves, scaly beneath or silvery white Besides the two here described, *H Fomes,* Buch, Hook Fl Ind i 363 (*H minor,* Roxb Fl Ind iii 142, Kurz i 141) is a tree of Sylhet Chittagong Arracan and the deltas of the Ganges and Irrawaddy It has a red brown, strong wood, weighing 66 lbs per cubic foot, and used for boats, bridges and house building

Heartwood red, very hard. Numerous transverse bars between the medullary rays.

1. H. littoralis, Dryand, Hook Fl Ind. i 363, Roxb Fl Ind. iii 142, Beddome xxxiii., Kurz i. 140. Vern. *Sunder, sundri,* Beng.; *Penglai-kanazo,* Burm, *Mautda,* And.

A small gregarious evergreen tree. Bark dark grey, with longitudinal cracks Sapwood white, heartwood dark red, very hard, close-grained. Pores moderate-sized to large, often oval and subdivided into compartments Medullary rays uniform, moderately broad, short, wavy, with numerous, very fine, white, transverse bars, the distance between two rays being generally equal to the transverse diameter of the pores.

Coasts and tidal forests of Bengal, the Peninsula, Burma and the Andaman Islands

Weight, as much as 104 lbs when wet, according to Schlich The weight of seasoned wood, as well as the value of P, have been determined by the following

The wood is generally light, soft, often spongy, with large pores and moderately broad or broad medullary rays, which are very prominent on a radial section.

1. **S. urens**, Roxb. Fl. Ind. iii. 145; Hook. Fl. Ind. i. 355; Beddome xxxii; Brandis 33; Kurz i. 135. Vern. *Gúlú, kúlú, gular, tabsi, tanuku, karrai*, Hind.; *Odla, hatchanda*, Ass.; *Tabsu*, Tel.; *Vellay pútali*, Tam.; *Hittúm, pinoh*, Gondi; *Takli*, Kurku; *Karai, kandol, gwira*, Mar.; *Kalru*, Ajmere; *Kalauri*, Panch Mehals.

A large deciduous tree. Bark ½ inch thick, very smooth, white or greenish grey, exfoliating in large thin irregular plates. Wood very soft, reddish brown with an unpleasant smell, with lighter coloured sapwood. Prominent and regular concentric lines, which may possibly be annual rings. Pores large, often oval and subdivided, frequently filled with gum. Medullary rays moderately broad, on a radial section prominent as long, dark, undulating bands, giving the wood a mottled and reticulate appearance; the distance between the rays is larger than the transverse diameter of the pores.

Sub-Himalayan tract from the Ganges eastwards, Southern India and Burma.

Weight, about 42 lbs. per cubic foot; Kyd gives for Assam wood: Weight 18 lbs., P = 103, but it seems probable that Kyd's specimen was not this, but *S. villosa.*

Wood used to make native guitars and toys. It yields a gum called '*Katila*' or '*Katira*.' The seeds are roasted and eaten by Gonds and Kurkus in the Central Provinces. Its bark gives a good fibre, and fine specimens of it from Berar were sent to the Paris Exhibition of 1878 (C. 984 from Bairagarh Reserve, Melghát.)

		lbs.
P 471.	Ajmere	35
P 3220.	Nagpahar, Ajmere	...
C 1102.	Ahiri, Central Provinces	39
D 1088.	Madura, Madras	51

2. **S. villosa**, Roxb. Fl. Ind. iii. 153; Hook. Fl. Ind. i. 355; Beddome xxxii; Brandis 32; Kurz i. 136; Gamble 10. Vern. *Poshwa*, Sutlej; *Udal, udar*, Hind.; *Gul-bodla, gul-kandar, massu*, Punjab; *Kanhlyem*, Lepcha; *Kúdar, baringa*, Gondi; *Buti*, Kurku; *Omak, odela, salua*, Ass.; *Udare*, Gáro; *Vake nar, arni, ani-nar*, Tam.; *Sambeing*, Magh.

A moderate-sized tree. Bark grey or brown. Wood grey, very soft, spongy. Annual rings prominent. Pores large, often subdivided. Medullary rays moderately broad, harder than the white spongy tissue between them, joined by numerous transverse bars. On a radial section the pores and medullary rays are distinctly visible, giving the wood a reticulate and mottled appearance.

Sub-Himalayan tract from the Indus eastwards; common in forests throughout India and Burma.

Growth fast, 3 to 6 rings per inch of radius. Weight, 15 to 22 lbs. per cubic foot. Wood not used. The tree is valuable on account of its fibre, which is coarse but strong. It is made into ropes and coarse bags, and in Bengal, Burma and South India into ropes and breastbands for dragging timber. Specimens were sent to the Paris Exhibition of 1878 from many provinces, but especially from Bengal and from Berar (C 986, for Bairagarh Reserve, Melghát). It gives a white pellucid gum which exudes copiously from cuts in the bark. It coppices freely, and is extremely difficult to extirpate in clearings.

		lbs.
E 2324.	Sivoke, Darjeeling Terai	22
E 620.	Bamunpokri, Darjeeling Terai	15
W 847.	South Kanara	20

3 S coccinea, Roxb Fl Ind iii 151, Hook Fl Ind i 357, Kurz i 137, Gamble 11 Vern *Sitto udal,* Nep, *Katior,* Lepcha.

A small evergreen tree, with smooth, light grey bark Wood grey, spongy, extremely soft Structure similar to that of *S urens* Transverse bars distinct

Eastern Himalaya ascending to 6 000 feet Assam Khasia Hills, hills of Burma

Weight, 17 lbs per cubic foot.

Bark used for the same purposes as that of *S villosa* but less commonly

	lbs
E 573 Khooklong Forest Darjeeling Terai	17

4 S colorata, Roxb Fl Ind iii 146, Hook Fl Ind i 359, Beddome xxxii, Brandis 34, Kurz i 138, Gamble 11 Vern *Bodula, walena samarri,* Hind, *Moola,* Beng, *Sitto udal, phirphiri, omra,* Nep, *Kanhlyem,* Lepcha, *Bolaong,* Garo, *Khowsey, pinj,* Berar, *Bhai koi,* Bombay, *Karaka,* Tel, *Wet shaw,* Burm, *Berdá,* And

A moderate sized tree Bark grey Wood grey, very soft Structure similar to that of *S urens,* but medullary rays broader and shorter, and transverse bars distinct

Central and South India, Burma

eight 24 lbs per cubic foot
he fibre were sent from Berar to
erve Melghat)

	lbs
E 1394 Chittagong	24

2 HERITIERA Blume

Contains 3 Indian trees of which 2 are here described They have simple leaves scaly beneath or silvery white Besides the two here described *H Fomes* Buch Hook Fl Ind i 363 (*H minor* Roxb Fl Ind iii 142 Kurz i 141) is a tree of Sylhet Chittagong Arracan and the deltas of the Ganges and Irrawaddy It has a red brown strong wood weighing 66 lbs per cubic foot and used for boats, bridges and house building

Heartwood red very hard Numerous transverse bars between the medullary rays

1 H littoralis, Dryand, Hook Fl Ind i 363, Roxb Fl Ind iii 142, Beddome xxxiii, Kurz i 140 Vern *Sunder, sundri,* Beng, *Penglai kanazo,* Burm, *Hawtda,* And

A small gregarious evergreen tree Bark dark grey, with longitudinal cracks Sapwood white, heartwood dark red, very hard, close-grained Pores moderate sized to large, often oval and subdivided into compartments Medullary rays uniform, moderately broad, short, wavy, with numerous, very fine, white, transverse bars, the distance between two rays being generally equal to the transverse diameter of the pores

Coasts and tidal forests of Bengal, the Peninsula, Burma and the Andaman Islands

Weight as much as 104 lbs when wet according to Schlich The weight of seasoned wood as well as the value of P, have been determined by the following

experiments which shew that the weight may be tolerably correctly taken at 65 lbs. and the value of P at 850:—

Experiment by whom made.	Year.	Wood whence procured.	Number of experiments.	Size of bar.	Weight.	Value of P.
				Ft. in. in.	lbs.	
Brandis	1864	Bengal	9	6 × 2 × 2	62	860
"	"	"	2	6 × 2 × 1½	63	927
"	1865-6	"	1	6 × 2 × 2	65	783
"	"	"	5	3 × 1 × 1	66	1,288
Skinner, No. 70	1862	Burma	...	......	64	816
Kyd	1831	Assam	1	2 × 1 × 1	67	710
Campbell	"	Bengal (seasoned)	2	6 × 2 × 2	62·5	1,038
"	"	" (unseasoned)	2	6 × 2 × 2	68	744
Baker	1829	" (5 years old)	4	7 × 2 × 2	64	984
"	"	" (4 years old)	1	6 × 2 × 2	62	859
"	"	" "	9	3 × 1½ × 1	...	848
"	"	" "	10	2 × 1 × 1	...	808
"	"	" "	6	7 × 2 × 2	68	883
Wallich	...	India	1	......	59	......
"	...	"	1	......	47	......
Smythies	1878	Different places	6	......	65	......

Sundri wood is durable; it is heavy and does not float, and is extremely tough. It is used for a great variety of purposes, such as beams, buggy shafts, planking, posts, furniture, firewood; but chiefly in boat-building, for which purpose it is very extensively used in Calcutta, and particularly in the Government Dockyard at Kidderpore. It is the chief timber of the Sundarbans forests. Its reproduction is most favourable. On all lands flooded by ordinary flood-tides, a new growth of jungle springs up immediately; but on land ordinarily above high-water mark, it only establishes itself by slow degrees. It soon spreads itself on newly formed islands on the sea edge of the forests. "The roots of the Sundri do not penetrate deep into the ground, but spread laterally 2 to 3 feet below the surface, sending out perpendicular tough shoots, which stand from 3 to 15 inches in height all round the parent stem; and when there are many trees close together, walking through a Sundri forest is very much like finding one's way among a fine growth of inverted tent pegs."—*Home, in "Bengal Forest Report, 1873-74, paragraph 13,"* which, as well as Dr. Schlich's article in the "Indian Forester," Vol. i, p. 6, may be referred to for further details about Sundri.

The Sundri forests are generally very well stocked. Valuations made by Home in 1873-74 gave, for the average amount of material per acre of Sundri forest,—

Seedlings and saplings under 3 feet girth	No. 2,487
Trees above 3 feet girth	" 182

		lbs.
E 401.	Sundarbans	70
E 2916.	"	66
B 3123.	Burma (1862)	69
B 517.	Andaman Islands	63
B 2285.	" " (1866)	68
B 2226.	" " "	53

2. H. Papilio, Beddome t. 218.; Hook. Fl. Ind. i. 363. Vern. *Soundalay únnu*, Tinnevelly.

A very lofty tree. Wood red, very hard, structure similar to that of *H. littoralis*, but pores less numerous and smaller, and transverse bars more numerous and more prominent.

Evergreen forests of the Western Ghâts between Travancore and Tinnevelly.

Weight, 63 lbs. per cubic foot. Wood used for building, cart poles and agricultural implements.

		lbs.
D 1066.	Tinnevelly	63

3 HELICTERES, Linn

The genus contains, besides
small shrubs of Northern and
Fl Ind i 365, and *H spicata*,
as Sikkim

1. H. Isora, Linn , Hook Fl Ind i 365, Roxb Fl Ind iii 143, Beddome xxxiii, Brandis 34, Kurz i 142 Vern *Maror phal, jonkaphal, kapasi, bhendu*, Hind , *Itah*, Godavari, *Atta* Gondi, *Kori-buta*, Kurku, *anteri*, Banswara, *Gubadaria, kavanchi*, Tel , *Kewan, maradsing*, Bombay, *Thoognaychay*, Burm

A shrub with grey bark, wood white, soft Pores numerous, small, often in radial lines Medullary rays fine and very fine

Sub Himalayan tract from the Jhelum eastward, Bengal South and Central India and Burma

Growth moderate 10 rings per inch of radius Weight, 35 lbs per cubic foot. The branches are used for fuel fencing and thatching and the bark yields a strong white fibre made into coarse cordage and canvas for gunny bags (specimens from Berar sent to Paris Exhibition, 1878 C 987 Bairagarh Reserve Melghat) The fruit is remarkable for its spirally twisted carpels, it is used in native medicine

		lbs
C 2804.	Melghat, Berar	35

4. PTEROSPERMUM, Schreb

Twelve species of this genus occur in India Of these two are found in North West India thr e in North East India seven in Southern India and five in
s and generally oblique,
ainder, *P lanceæfolium*,
Kurz i 146 Vern *Ban*
m the Jumna eastwards
Wall, *P diversifolium*,
P glabrescens, W and A, and *P rubiginosum*, Heyne, Beddome t 106 Vern *Kara toveray* Tinnevelly, are trees of South India, while *P cinnamomeum*, Kurz i 147, and *P javanicum*, Jungh, are trees of Burma

Wood reddish, moderately hard Pores small and moderate-sized, often in short radial lines. Medullary rays fine, closely packed

1 P acerifolium, Willd , Hook Fl Ind i 368, Roxb. Fl Ind iii, 158, Beddome xxxv, Brandis 35, Kurz i 145, Gamble 11 Vern *Kanak-ungpetwoon*, Burm
white, heartwood
oval or elongated,
Medullary rays
uniform and equi-

Sub Himalayan tract from the Jumna eastwards, Bengal, Chittagong and Burma Often planted for ornament

foot Wood somewhat resem-
d for planking in Bengal Leaves
ngal The down on the leaves

		lbs
E 593	Khookloong Forest, Darjeeling Terai	44
E 3135	Sukna	45
B 2510	Burma (1862)	51

2. P. suberifolium, Lam.; Hook. Fl. Ind. i. 367; Beddome xxxiv; *P. canescens*, Roxb. Fl. Ind. iii. 162. Vern. *Baelo*, Uriya; *Lolagu*, Tel.; *Taddo*, Tam.; *Velenge*, Cingh.

A moderate-sized tree, wood light red, moderately hard; structure the same as that of *P. acerifolium*. Medullary rays closely packed.

Northern Circars and Carnatic.
Weight, 36 to 40 lbs. Wood tough, used for building, carts and other purposes.

		lbs.
C 1250.	Gumsúr	38
C 1311.	„	40
No. 91.	Ceylon Collection	36

3. P. semi-sagittatum, Ham.; Hook. Fl. Ind. i. 368; Roxb. Fl. Ind. iii. 160; Brandis 35; Kurz i. 146. Vern. *Nagyee*, Burm.; *Nwaleinbyeng*, Magh.

A moderate-sized tree with an irregularly shaped, fluted stem and grey bark 1 to 2 inches thick. Wood reddish grey, moderately hard; structure the same as that of *P. acerifolium*, but with more numerous pores and a few broader medullary rays.

Chittagong and Burma; sometimes planted in other parts of India.
Growth moderately fast, 6 rings per inch of radius. Weight, 40 to 50 lbs. per cubic foot. Wood durable.

		lbs.
B 2511.	Burma (1862)	40
B 2706.	Tavoy (Wallich, 1828).	50

Similar in structure to this is B 1418, sent from Burma under the name of Hman, the chief difference between its wood and that of P. semi-sagittatum being that it is scented, smoother and has much smaller pores.

5. ERIOLÆNA, DC.

Contains six Indian species, one of which comes from Central India, two from the Eastern and Central Himalaya, three from Southern India and one from Burma.
Besides the species here described, there are *E. Stocksii*, Hook. f. and Th.,; Hook. Fl. Ind. i. 370, a shrub; *E. quinquelocularis*, Wight; Beddome xxxv., a tree from Southern India; and *E. spectabilis*, Planch.; Hook. Fl. Ind. i. 371, from the Himalaya.

Heartwood hard, reddish, close-grained, mottled. Pores moderate-sized, in rings of soft tissue often arranged in concentric bands. Medullary rays moderately broad, uniform.

1. E. Wallichii, DC.; Hook. Fl. Ind. i. 370. *Eriolæna* sp., Gamble 11. Vern. *Kubindé*, Nep.

A small tree, bark ⅓ inch thick, brown. Sapwood grey; heartwood reddish brown, hard, mottled. Pores moderate-sized, often subdivided, enclosed in irregular patches of soft tissue, and frequently arranged in concentric lines. Medullary rays moderately broad and very fine.

Nepal and Sikkim Himalaya.
Weight, 40 lbs. per cubic foot. Wood much esteemed by Nepalese.

		lbs.
E 2326.	Bamunpokri, Darjeeling	40

2. E. Hookeriana, W. and A.; Hook. Fl. Ind. i. 370; Beddome xxxv; Brandis 36. Vern. *Nar-botku*, Tel.; *Arang*, Berar; *Kútki*, *bhonder*, Gondi.

A small tree. Bark grey. Wood light red. Annual rings marked by an alm ontinuous line of pores. Pores small and moderate-sized,

often subdivided, enclosed in rings of soft texture Medullary rays moderate-sized, wavy. Structure similar to that of the wood of *Kydia calycina*, but transverse bars wanting

Central and Southern India

nch of radius The bark Exhibition of 1878 from

C 3791 Chanda, Central Provinces . . . .

3. E. Candollei, Wall, Hook. Fl. Ind i. 370, Kurz i 148.
Vern *Dwanee*, Burm

A deciduous tree, with grey bark Heartwood brick-red, with orange and brown streaks, old pieces, however, losing their bright colour, hard, close-grained, shining, takes a beautiful polish, seasons well Pores round, moderate-sized, in narrow rings of white tissue, prominent on a vertical section Medullary rays numerous, white, prominent, fine and moderately broad Annual rings marked by sharp concentric lines. Pores frequently arranged in concentric lines, and sometimes joined by narrow, wavy, concentric bands of soft tissue

Burma.

Weight, according to Kurz 47, according to Brandis experiments 48 lbs, our specimens average 51 lbs According to Brandis four experiments made in 1864, with bars 3 × 1′ × 1′ the value of P is = 1020 which shews great transverse strength Wood used for gunstocks paddles and rice pounders it is very handsomely marked and is well worthy of attention

		lbs
B 286	Burma (1867)	41
B 326	„ „	53
B 1455	„	54
B 2512	„ (1862)	55

E 1951 (45 lbs) is a wood received from Chittagong under the name *Mossé* It is soft, reddish grey, with a small darker heartwood, splits and warps Pores moderate sized, subdivided often in short radial strings Medullary rays short moderately broad, joined by innumerable transverse bars In structure the wood resembles that of *E Candollei*, but the specimens of leaves which accompanied the wood sent belonged to *Brownlowia elata*, Roxb, a Tiliaceous tree The wood, however, has no resemblance to that of any of the latter family

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ORDER XIX TILIACEÆ

Contains 11 Indian genera Of these, 9 are trees, shrubs or climbers, and 2 *Corchorus* and *Triumfetta*, herbs or undershrubs. The Order is divided into 4 Tribes, viz —

Tribe I — Brownlowieæ	*Brownlowia, Pentace* and *Berrya*
„ II — Grewieæ	*Grewia Columbia, Trinocarpus* and *Triumfetta*
„ III — Tilieæ .	*Corchorus* and *Plagiopteron*
„ IV — Heteropetalæ . .	*Echinocarpus* and *Elæocarpus*

Brownlowieæ contains 3 species: *B. elata*, Roxb.; Hook. Fl. Ind. i. 381; Kurz i. 153 (*Humea elata*, Roxb. Fl. Ind. ii. 640.) Vern. *Masjot*, a lofty tree of the tidal forests of Chittagong and Tenasserim (see p. 51, under *Eriolæna* in Sterculiaceæ No. E 1951); *B. lanceolata*, Bth.; Hook. Fl. Ind. i. 381, of the tidal forests of the Sundarbans, Arracan and Tenasserim, and *B. peltata*, Bth.; Kurz i. 153 of Tenasserim. *Columbia* includes two shrubs of Burma. *Erinocarpus Nimmoanus*, Grah.; Hook. Fl. Ind. i. 394; Beddome t. 110. Vern. *Chowra, jangli bendi*, Kan., is a fibrous-barked tree of the western coast, and *Plagiopteron fragrans*, Griff.; Hook. Fl. Ind. i. 399, a climbing shrub of Mergui. To the genus *Corchorus* belongs the Jute Plant, *C. capsularis*, Linn.; Vern. *Pat*, Beng., now extensively grown in and exported from Bengal: and other species, all of which yield fibres. Several species of *Triumfetta* also yield fibres, *e. g.*, *T. angulata*, Lam. (*T. rhomboidea*, Jacq.; Fl. Ind. i. 395) Vern. *Chikti*, Hind., of which fine specimens were sent from Berar to the Paris Exhibition (C. 988. Bairagarh Reserve, Melghát). *Tilia europæa*, L., the Lime Tree or Linden of Europe, belongs to this Order.

The wood of Tiliaceæ is marked by numerous, uniformly distributed, small or moderate-sized pores, and fine, equidistant, medullary rays.

1. PENTACE, Hassk.

1. P. burmanica, Kurz; Hook. Fl. Ind. i. 381; Kurz i. 154. Vern. *Thitka, kathitka*, Burm.

A very large, tall tree. Wood yellowish red, shining, soft, even-grained, takes a good polish. Pores moderate-sized, often oval and subdivided into compartments, numerous, uniformly distributed. Medullary rays moderately broad, wavy, red, visible on a radial section, equidistant; the distance between the rays generally equal to the transverse diameter of the pores. Annual rings visible.

Burma.

Growth rapid, 3 to 4 rings per inch of radius. Weight, 42 lbs. on an average. Now very largely used in Burma for boats, boxes and other purposes for which a light wood is required. Large quantities are annually exported, and though a few years ago the wood was quite unknown, it is now well known, even in European markets.

			lbs.
B	281.	Burma (1867)	42
B	802.	Tharrawaddi, Burma	41
B	815.	Rangoon „	43
B	1386.	Moulmein „	41
B	3119.	Burma (1862)	42

2. BERRYA, Roxb.

1. B. Ammonilla, Roxb. Fl. Ind. ii. 639; Hook. Fl. Ind. i. 383; Beddome t. 58; Kurz i. 155. The Trincomali Wood. Vern. *Petwoon*, Burm.; *Halmillila*, Cingh. (whence the specific name).

A large tree with thin bark. Heartwood dark red, very hard, close-grained, but apt to split; it has, even when old, a smooth, rather damp feel. Pores small, oval, subdivided, enclosed in white patches, which are united by narrow undulating bands of soft tissue. Medullary rays prominent, numerous, uniform and equidistant; the distance between the rays equal to the transverse diameter of the pores.

South India, Burma and Ceylon.

The Weight and Transverse strength have been determined by the following experiments —

Experiment by whom conducted	Year	Wood whence procured	Number of experiments	Size of scantling	Weight.	Value of P
				Ft in in		
Brandis	1864	Burma	7	3 × 1 × 1 / 2 × 1 × 1	64	825
„ No 8	1862	„			56 62	
Puckle		Mysore	2	2 × 1 × 1		971
Skinner No 28	1862	Ceylon		Various	50	784
„ No 31	„	„			63	1 012
Cat Exh 1862	„			3 × 1½ × 1½	50	622–1023
Baker	1829	„	3	6 × 2 × 2	51	700
A Mendis No 33		„		2 × 1 × 1	48	844
Smythies	1878	Burma	6		61	

Benson's *Byttneria*, weighing 72 lbs is probably this The wood is very durable No B 2722 had been 50 years in Calcutta and was perfectly sound and good on being cut into It is used for carts agricultural implements and spear handles, and in Madras for masúla boats, and is much esteemed for toughness and flexibility

		lbs
B 288	Burma (1867)	52
B 327	„ (1866)	61
B 1420	Tharrawaddi Burma	65
B 1452	Prome, Burma	65
B 2722	Tavoy (Wallich, 1828)	63
B 3118	Burma (1862)	58

3 GREWIA, Linn.

A large genus containing about 30 Indian trees and shrubs distributed all over India, except in the inner arid Himalaya *G oppositifolia* is found as high up as 6 000 feet in the North West Himalaya There are 12 species in North West and Central India 8 in the North-East 17 in South India and 10 in Burma

The genus contains 3 sections of which the first, *Grewia*, contains the majority of species The second, *Omphacarpus*, contains only one species *G calophylla* Kurz i 157 Vern *Mayanbo*, Burm a small evergreen tree of the coast forests of the Andamans The third *Microcos* contains two species *G sinuata* Wall. Hook Fl Ind i 392, Kurz i 158 a large and *G Microcos*, Linn , Hook Fl Ind i

The fruit is eaten and the inner bark made into cordage Fine specimens of this were sent from Berar for the Paris Exhibition of 1878 (C 983 Bairagarh Reserve Melghat)

		lbs
C 188	Mandla Central Provinces (1871)	48
C 1169	Ahiri Reserve Central Provinces	46
C 2757	Moharli Reserve Central Provinces	53
C 2766	Melghat Berar	
C 1253	Gumsur Madras	49
No 17	Ceylon Collection	44

4 **G salvifolia,** Heyne, Hook Fl Ind i 386, Beddome xxxvii, Brandis 43 Vern *Bather, nikki bekkar, gargas,* Pb , *Saras,* Ajmere, *Jara,* Circars

A small tree, with dark coloured bark Wood yellow heartwood orange brown, hard, close grained, structure similar to that of *G tiliæfolia,* but medullary rays more numerous and pores smaller Annual rings well marked by a line of larger pores

Punjab Sind Central Provinces and Southern India
Growth slow Fruit small edible

P 3227	Nagpahar Ajmere	...
P 3237	Goran Hills Ajmere	

5 **G vestita,** Wall , Brandis 40, Gamble 12 *G elastica,* Royle, Kurz i 160 *G asiatica,* Linn var , Hook Fl Ind i 387 Vern *Farri, phalwa, dhamman,* Pb , *Pharsia, dhamun, bimla* Hind , *Poto dhamun,* Palamow, *Sealposra,* Nep , *Kunsung,* Lepcha , *Pintaya i,* Burm

A small tree, with grey or brown bark Wood greyish white, hard and close grained Annual rings wavy Pores moderate sized Medullary rays fine and moderately broad numerous, prominently marked on a radial section, and giving the wood a beautiful silver grain

Sub Himalayan tract from the Indus eastwards Bengal Central India and Burma

Growth moderately slow 5 to 7 rings per inch of radius Weight our specimens ays 50 lbs Wood tough and elastic Splits well and is sometimes used

		lbs
E 651	Bamunpokri Darjeeling Terai	43
E 2325		51
B 3120	Burma (1862)	51

6 **G asiatica,** Linn , Hook Fl Ind i 386, Roxb Fl Ind ii 586, Beddome xxxvii , Brandis 40, Kurz i 161. Vern *Phalsa,* Hind , *Dhamni,* Ajmere

A small tree Bark rough, grey Wood yellowish white, structure similar to that of *G vestita*

Wild in Central India and Rajputana Cultivated throughout India for its fruit Bark used in rope making

P 170	Ajmere	...
P 3218	Nagpahar Ajmere	...
P 3235	Goran Hills Ajmere	

7 **G multiflora,** Juss , Hook Fl Ind i 388, Gamble 12 *G sepiaria,* Roxb Fl Ind ii 589 , Brandis 42 Vern *Pansaura,* Hind , Beng , *Atlay,* Nep

A shrub or small tree Bark brown Wood white, soft, similar in structure to that of *G oppositifolia,* but with smaller pores

bhewal, bhimúl, kakki, Hind.; *Allpeyar,* Tel.; *Dansagla,* Lepcha, is a small tree of the outer Himalaya, from the Jumna eastwards, Assam, Central and Southern India and Burma, recognized by its long, tapering, glabrescent leaves; while *G. abutilifolia,* Juss.; *Hook. Fl. Ind.* i. *330;* Beddome xxxvii (*G. aspera,* Roxb. Fl. Ind. ii. 591) Vern. *Pedda taraki,* Tel., is a small tree found in Southern India. Some species of *Grewia* have edible fruits, and the wood of some is strong, tough and elastic.

The wood of *Grewia* has small or moderate-sized pores, uniformly distributed, and numerous fine, rarely moderately broad medullary rays. The annual rings are generally marked.

1. G. oppositifolia, Roxb. Fl. Ind. ii. 583; Hook. Fl. Ind. i. 384; Brandis 537. Vern. *Dhamman, pharwa,* Pb.; *Biúl, biúng, bahúl, bhimal, bhengal,* Hind.; *Bieul,* Simla; *Pastuwanne,* Afg.

A moderate-sized tree, with grey bark. Wood white, with a small mass of irregularly-shaped heartwood, hard, giving out an exceedingly unpleasant odour, especially when fresh cut. Annual rings marked by white lines. Pores moderate-sized, very numerous, uniformly distributed. Medullary rays fine, white, wavy, very numerous.

North-West Himalaya, from the Indus to Nepal, ascending to 6,000 feet.

Growth moderate, 7 rings per inch of radius. Weight, 45 to 50 lbs. per cubic foot. The wood is used for oar-shafts, handles, bows, &c., and for most purposes for which elasticity and toughness are required. The bark gives a fibre which is much used in the Punjab for rope and paper-making, but is not durable. The tree is much lopped for feeding cattle during the winter.

		lbs.
H 100.	Bhajji, Simla, 4,000 feet	45
H 154.	Sainj, „ 3,000 „	50

2. G. populifolia, Vahl.; Hook. Fl. Ind. i. 385; Brandis 38. Vern. *Ganger,* Pb.; *Gango,* Sind; *Gangerun,* Rajputana.

A small shrub, with grey bark. Wood yellow, hard, close-grained. Annual rings marked by an almost continuous line of slightly larger pores. Pores small, numerous, uniformly distributed. Medullary rays very fine, white, wavy, very numerous.

Arid zone, in the Punjab, Sind and Rajputana.

Growth very slow. The wood is used for walking sticks and the fruit is eaten.

P 3228. Nagpahar, Ajmere . . . .

3. G. tiliæfolia, Vahl.; Hook. Fl. Ind. i. 386; Roxb. Fl. Ind. ii. 587; Beddome t. 108; Brandis 41; Kurz i. 161. Vern. *Pharsa, dhamin,* Hind.; *Khesla, kasúl,* Gondi; *Dhamni,* Kurku; *Charachi, tharrá,* Tel.; *Dhamono,* Uriya; *Thadsal, batala,* Kan.; *Damnak,* Bhíl; *Daman,* Mar.; *Sadachu,* Mal.; *Daminne,* Cingh.

A moderate-sized tree. Bark ⅓ inch thick, grey on young trees, dark brown on old trees. Sapwood white; heartwood small, brown, close-grained, hard. Annual rings visible. Pores moderate-sized, numerous, uniformly distributed; a continuous belt of pores in the spring wood; autumn wood harder. Medullary rays fine, prominent on a radial section, giving a handsome silver grain; the distance between the rays equal to the transverse diameter of the pores.

Sub-Himalayan tract from the Jumna to Nepal, ascending to 4,000 feet; Central and South India.

Growth moderate, about 6 rings per inch of radius. Weight, according to Skinner No. 75, 34 lbs.; Brandis says 30 to 40 lbs.; the average of those examined gave 48 lbs. Skinner's experiments in South India gave P = 565. Used for shafts, shoulder poles, masts, oars and all purposes for which elasticity, strength and toughness are required.

The fruit is eaten and the inner bark made into cordage Fine specimens of this were sent from Berar for the Paris Exhibition of 1878 (C 983 Bairagarh Reserve Melghât)

		lbs
C 188	Mandla Central Provinces (1871)	48
C 1169	Ahiri Reserve Central Provinces	46
C 2707	Moharli Reserve Central Provinces	53
C 2766	Melghat Berar	
C 1203	Gumsur Madras	49
No 17	Ceylon Collection	44

4 **G salvifolia,** Heyne, Hook Fl Ind i 386, Beddome xxxvii, Brandis 43 Vern *Bathei, nikki-bekhar, gaigas,* Pb, *Saras,* Ajmere, *Jara,* Circars

A small tree, with dark coloured bark Wood yellow, heartwood orange brown, hard, close grained, structure similar to that of *G tiliæfolia*, but medullary rays more numerous and pores smaller Annual rings well marked by a line of larger pores

Punjab Sind Central Provinces and Southern India
Growth slow Fruit small edible

P 3227	Nagpahar Ajmere	...
P 3237	Goran Hills Ajmere	

5 **G vestita,** Wall, Brandis 40, Gamble 12 *G elastica,* Royle, Kurz i 160 *G asiatica,* Linn var, Hook Fl Ind i 387 Vern *Fairi, phalwa, dhamman,* Pb, *Pharsia, dhamun, bimla,* Hind, *Poto dhamun,* Palamow, *Sealposra,* Nep, *Kunsung,* Lepcha, *Pintayan,* Burm

A small tree, with grey or brown bark Wood greyish white, hard and close grained Annual rings wavy Pores moderate sized Medullary rays fine and moderately broad numerous, prominently marked on a radial section, and giving the wood a beautiful silver grain

Sub Himalayan tract from the Indus eastwards Bengal Central India and Burma
Growth moderately slow 5 to 7 rings per inch of radius Weight our specimens ays 50 lbs Wood tough and elastic Splits well and is sometimes used

		lbs
E 651	Bamunpokri Darjeeling Terai	43
L 2325		51
B 3120	Burma (1862)	51

6 **G asiatica,** Linn, Hook Fl Ind i 386, Roxb Fl Ind ii 586, Beddome xxxvii, Brandis 40, Kurz i 161 Vern *Phalsa,* Hind, *Dhamni,* Ajmere

A small tree Bark rough, grey Wood yellowish white structure similar to that of *G vestita*

Cultivated throughout India for its fruit

P 3218	Nagpahar Ajmere	...
P 3235	Goran Hills Ajmere	...

7 **G multiflora,** Juss, Hook Fl Ind i 388, Gamble 12 *G sepiaria,* Roxb Fl Ind ii 589, Brandis 42 Vern *Pansaura,* Hind, Beng, *Nilay,* Nep

A shrub or small tree Bark brown Wood white, soft, similar in structure to that of *G oppositifolia*, but with smaller pores

Outer Himalaya from Nepal eastwards, ascending to 4,000 feet, Khasia Hills. Used in Bengal for making hedges, for which it is very useful.

		lbs.
E 2327.	Sivoke, Darjeeling Terai	42

8. G. pilosa, Lam.; Hook. Fl. Ind. i. 388; Brandis 39. *G. carpinifolia*, Roxb. Fl. Ind. ii. 587. Vern. *Posanoni*, Ajmere.

A shrub with four-angled stem and brown bark. Wood yellowish white, hard, divided into triangular wedges proceeding from the centre towards the four corners and sides, the annual rings in the wedges towards the corners marked by large pores, those towards the sides by a white line and a few moderately large pores. Pores in the rest of the wood small. Medullary rays fine, white, numerous.

Plains of the North-West, Central and South India.

P 3230.	Nagpahar, Ajmere	...
P 3256.	Goran Hills, Ajmere	...

4. ECHINOCARPUS, Blume.

Contains 5 large trees of the forests of the north-east and east moist zone in Sikkim, Bhutan, Assam, the Khasia Hills and Burma. *E. sterculiaceus*, Bth.; Hook. Fl. Ind. i. 400; Gamble 12. Vern. *Banj*, Nep.; *Thabola*, Magh, is a very large tree of the Sikkim Terai, Chittagong and Burma, with a deeply buttressed trunk and large fruit covered with long needle-like spines. *E. tomentosus*, Bth.; Hook. Fl. Ind. i. 400; Gamble 12. Vern. *Kaktay*, Nep.; *Taksor*, Lepcha, is a large tree of the Sikkim Hills from 2,000 to 4,000 feet. *E. Murex*, Bth.; Hook. Fl. Ind. i. 399, is a large tree of the Khasia Hills and Burma (*E. Sigun*, Bl.; Kurz i. 162); and *E. assamicus* Bth.; Hook. Fl. Ind. i. 399. Vern. *Jubba hingori*, Ass., a tree of Upper Assam, whose wood, according to Mr. Mann, is used for planking.

1. E. dasycarpus, Bth.; Hook. Fl. Ind. i. 400; Gamble 12. Vern. *Gobria*, Nep.

A large tree. Bark dark grey. Wood greyish brown, soft. Pores small. Medullary rays fine and moderately broad, closely packed, straight, prominent on a radial section.

Eastern Himalaya, 5,000 to 7,000 feet. (Hooker, in Fl. Ind., says: "Sikkim at 2,000 feet," but I have never seen it below 5,000 feet.—*J. S. G.*)

Weight, 32lbs. per cubic foot. Used for planking, for tea-boxes and to make charcoal. It is in considerable demand in Darjeeling. The tree is very handsome, as it has showy clusters of yellow-white flowers, capsular fruit, with short close-set spines, black seeds with a red arillus, and drooping branches. It flowers and seeds freely each year, and seedlings come up well.

		lbs.
E. 694.	*Chuttockpur, Darjeeling, 6,000 feet*	32

E. 1289 sent from Cachar under the name '*Sitarjat*' has a similar structure, but the pores are larger. This is probably *E. tiliaceus* of Mr. G. Mann's Assam Lists (*Phul hingori*, Ass.; *Sitarsaaz*, Cachar), Assam Forest Reports, 1874-75 and 1875-76. Said by Mr. Mann to be used for planks and beams where not exposed to changes of weather.

5. ELÆOCARPUS, Linn.

A large genus of trees, chiefly found in the moister parts of India; 25 species are found in India, of which the distribution is:—

North-Western India	1
North-Eastern India	14
Burma	17
Central India	1
Southern India	14

The genus is divided into three sections

Section I *Ganitrus* contains *E Ganitrus* Roxb Fl Ind. ii 592, Hook Fl Ind i 400 Beddome xxxvii Brandis 43, Kurz i 168 Vern *Rudrak* Hind a large tree of North Eastern and Central India the hard tubercled nuts of which are polished and made into rosaries and bracelets

Section II *Dicera* contains besides the two species described below *E serratus* Linn Hook Fl Ind i 401 Beddome xxxviii Vern *Jalpai*, Beng *Perinkára* Kan *Wiralu* Cingh a tree with edible fruit of Bengal the North East Himalaya and the Western Coast (Weight 33lbs Wallich) *E floribundus* Bl Hook Fl Ind i 401, Kurz i 167 of Eastern Bengal and Burma *E oblongus* Gaertn, Beddome xxxviii Vern *Bikki* Nilgiris of Southern India with a strong white tough wood and several other less common species

Section III *Monocera* contains *E tuberculatus* Roxb Fl Ind ii 594 Beddome

and Chittagong besides other species

The species of *Elæocarpus* have usually handsome flowers with laciniate petals, and the fruits of most species resemble an olive and are eaten

1 **E robustus**, Bl, Hook Fl Ind i 402, Roxb Fl Ind ii 597, Kurz i 169, Gamble 13 Vern *Jalpai*, Sylhet, *Bepari, batrachi*, Nep, *Chekio*, Magh, *Taumagyee*, Burm

An evergreen tree Wood white, shining, soft, even grained Annual rings marked by a prominent line Pores moderate sized, uniformly distributed, generally oval or elongated, subdivided Medullary rays fine and very fine, closely packed, visible as long narrow bands on a radial section

Eastern Himalaya ascending to 2 000 feet, Khasia Hills Eastern Bengal, Chittagong Burma and Andaman Islands

Growth moderate Weight 38lbs per cubic foot

		lbs.
E 581	Khookloong Forest Darjeeling Terai	38

2 **E lanceæfolius**, Roxb Fl Ind ii 598, Hook Fl Ind i 402, Kurz i 167, Gamble 13 Vern *Bhadras, batrachi*, Nep, *Shepkyew*, Lepcha, *Sakalang*, Ass

A large tree Wood soft light brown Pores small, in short strings of 2 to 5 Medullary rays extremely numerous, fine and very fine, appearing as narrow plates on a radial section.

Eastern Himalaya from 6 000 to 8 000 feet Khasia Hills Sylhet and Tenasserim Growth moderate, 8 rings per inch of radius Weight 41 lbs Used for house-building tea-boxes and charcoal Fruit edible

		lbs
E 358	Rangbul Darjeeling, 7 000 feet	41

Order XX LINEÆ

A small Order containing 4 genera of Indian trees or shrubs The only one of any importance is *Erythroxylon Reinwardtia* contains 2 small yellow flowered under shrubs of the Himalaya, Eastern Bengal and the Western Ghâts, *Hugonia Mystax*,

ORDER XXIII RUTACEÆ

ny size, but generally shrubs or

Tribe I —Ruteæ	Only herbs such as the garden Rue, and the *Bonninghausenia*, so common in Himalayan forests
„ II —Xanthoxyleæ .	*Evodia*, *Melicope* and *Xanthoxylum*
„ III —Toddalieæ .	*Toddalia*, *Acronychia* and *Skimmia*
„ IV —Aurantieæ .	*Glycosmis*, *Micromelum* *Murraya*, *Clausena* *Triphasia*, *Limonia* *Luvunga*, *Paramignya*, *Atalantia*, *Citrus* *Feronia* and *Aegle*

Melicope contains two shrubs *M indica* Wight Hook Fl Ind i 492 Beddome xl, of the higher ranges of the Nilgiri Hills and *M Helferi*, Hook f, of the Andaman Islands and Tenasserim *Acronychia laurifolia* Bl, Hook Fl Ind i 498, Kurz i 184, Gamble 14 (*A pedunculata*, DC Beddome xlii) Vern *Paowlay*, Nep, *Loajam*, Ass, is a small tree of the Sikkim Himalaya Khasia Hills, Assam, Chittagong South India and Burma *Glycosmis pentaphylla* Correa, Hook Fl Ind, i 499, Beddome xlii, Brandis 49, Kurz i 186, Gamble 14 Vern *Ban nimbu*, , *Taushouk* Burm, is a
uits, found in most part of
Bl, Hook Fl Ind. i 501,

which are *C pentaphylla*, DC, Brandis 49 Vern *Rattanjote*, *surjmukha teyrur*, Hind a deciduous shrub of the Sub Himalayan tract from the Jumna to Nepal and *C Willdenovii*, W and A, Hook Fl Ind i 506, Beddome xliv, Gamble 15 Vern *Mor kurangi*, Kaders, *Madanay* Nep, *Terhilnyok sidemnyok* Lepcha a small tree of the Sikkim Himalaya Western Ghats and Ceylon *Triphasia trifoliata* DC, Hook Fl Ind i. 507, Kurz i 192 is a small spinous garden shrub of South India and Burma *Limonia* contains 4 shrubs of India and Burma, of which *L acidissima*, Linn, Hook Fl Ind i 507, Beddome xlv, Brandis 47 Kurz i 192 (*L crenulata*, Roxb Fl Ind ii 381) Vern *Beli*, Hind, *Tor elaga* Tel, *Kawat*, Mar, *Theehaya za*, Burm a spinous shrub of dry hills in variou
grained wood is the most common *Luvunga*

st common is *P monophylla*,
e 15 Vern *Natkanta*, Nep,
from Sikkim down to Tenas
urantium, Linn Vern *Narangi*,
Suntala, Nep, *Kitchli*, Tam, *Kittali*, Tel,
ts of India, but especially in Sikkim and Sylhet
717), *C medica* Linn the Citron, Lemon and
C decumana, Willd, the Shaddock or Pumelo

The Rutaceæ have a very uniform structure The wood is close and even-grained, generally white, with a yellowish tinge The pores are small, uniformly distributed, with a tendency to form radial lines The medullary rays are fine, uniform and equidistant. The wood of *Skimmia* is anomalous, being distinguished by extremely small pores, arranged in oblique wavy tails, and by very fine, very numerous medullary rays The wood of most species is marked by white concentric lines, which are generally at unequal distances and often run into each other

Linn.; Hook. Fl. Ind. i. 413. is a rambling leafy shrub of Southern India; and *Ironanthes khasiana*, Hook. f.; Hook. Fl. Ind. i. 416. a small tree of the Khasia Hills. Many species give a strong fibre. *Linum usitatissimum* is the flax plant; cultivated in India for its fibre and oil.

I. ERYTHROXYLON, Linn.

Contains four Indian species. Besides the one described, *E. Kunthianum*, Wall.; Hook. Fl. Ind. i. 414; Kurz i. 171, is a shrub of Eastern Bengal, the Khasia Hills and Burma, above 3,000 feet elevation; and *E. burmanicum*, Griff.; Hook. Fl. Ind. i. 414; Kurz i. 171, a tree of Burma and the Andaman Islands.

The Coca or Spadic Plant of Peru, well known as a powerful stimulant of the nervous system, is the *E. Coca*.

1. E. monogynum, Roxb. Fl. Ind. ii. 449; Hook. Fl. Ind. i. 414; Kurz i. 171. *E. indicum*, Beddome t. 81. *Sethia indica*, DC. Prodr. i. 576. Bastard Sandal. Vern. *Devadarú*, Tam.; *Adivi gerenta*, Tel.

A small tree. Sapwood white; heartwood dark brown, with a pleasant resinous smell, very hard, takes a beautiful polish. Pores very small, very numerous. Medullary rays short, very fine, uniformly distributed.

South India and Ceylon.

Weight, 55 to 67 lbs. per cubic foot.

Used as a substitute for sandalwood. The wood gives an oil used as a preservative for native boats.

		lbs.
D 1083.	North Arcot	55
D 1091.	Madura	66
D 2027.	Mysore	67

ORDER XXI. MALPIGHIACEÆ.

An Order which is represented in India merely by two genera of climbing or straggling shrubs. *Hiptage Madablota*, Gaertn.; Hook. Fl. Ind. i. 418; Brandis 44; Kurz i. 173; Gamble 13. (*Gaertnera racemosa*, Roxb. Fl. Ind. ii. 368) Vern. *Kampti, madmalti*, Hind.; *Endra, chopar, benkar, kalumb*, Pb.; *Shemputi*, Nep.; *Haladwail*, Mar.; *Madúbúláta*, Beng., is a common climbing shrub of most parts of India and Burma; *H. candicans*, Hook. f.; Hook. Fl. Ind. i. 419; Kurz i. 174. Vern. *Toungsookapan*, Burm.; and *H. obtusifolia*, DC.; Kurz i. 173 are respectively a large shrub and a climber of Burma; *H. acuminata*, Wall.; Hook. Fl. Ind. i. 419, is a bushy shrub of the Khasia Hills; and *H. parvifolia*, W. and A.; Hook. Fl. Ind. i. 419, a shrub of Southern India and Ceylon: making 5 species. *Aspidopterys* contains 7 climbers, chiefly of the Himalaya, Southern India and Burma, but none of any special interest.

ORDER XXII. GERANIACEÆ.

A large Order, chiefly containing herbaceous plants, such as *Geranium*, *Oxalis* and *Impatiens*. Only one genus, *Averrhoa*, contains trees, and these introduced: *A. Carambola*, Linn.; Hook. Fl. Ind. i. 439; Roxb. Fl. Ind. ii. 450; Beddome xxxix.; Brandis 45; Kurz i. 177; Gamble 13. Vern. *Kamarang*, Hind.; *Kamrang*, Beng.; *Soungyah*, Burm., is a small tree which is commonly cultivated in India and Burma for its fruit, which is eaten stewed or made into preserves. Home says it is used in the Sundarbans for building purposes and furniture. Skinner, No. 18, gives its weight as 40 lbs. per cubic foot, and 712 for the value of P; Wallich gives its weight at 39 lbs. *A. Bilimbi*, Linn.; Hook. Fl. Ind. i. 439; Roxb. Fl. Ind. ii. 451; Beddome t. 117. Vern. *Bilimbi, bhimbu, anvalla*, Hind., is a small tree cultivated and often found run wild in India. It has an acid fruit, which is pickled or preserved in sugar, and the juice is used in removing iron stains from linen.

ORDER XXIII. RUTACEÆ.

ny size, but generally shrubs or clin

Tribe I.—Ruteæ	. . .	Only herbs such as the garden Rue, and the *Bonninghausenia*, so common in Himalayan forests
„ II.—Xanthoxyleæ	. . .	*Evodia*, *Melicope* and *Xanthoxylum*.
„ III.—Toddalieæ	. .	*Toddalia*, *Acronychia* and *Skimmia*
„ IV.—Aurantieæ	.	*Glycosmis*, *Micromelum*, *Murraya*, *Clausena*, *Triphasia*, *Limonia* *Luvunga*, *Paramignya*, *Atalantia*, *Citrus*, *Feronia* and *Aegle*.

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C. Willdenovii, W. and *Mor kurangi*, Kaders, *Madanay*, Nep, *Terhilnyok*, *sidemnyok*, Lepcha, a small tree of the Sikkim Himalaya, Western Ghats and Ceylon *Triphasia trifoliata*, DC, Hook Fl Ind i 507, Kurz i 192, is a small spinous garden shrub of South India and Burma. *Limonia* contains 4 shrubs of India and Burma, of which *L. acidissima*, Linn, Hook Fl Ind i 507, Beddome xlv, Brandis 47, Kurz i 192 (*L. crenulata*, Roxb Fl Ind ii 381) Vern *Beli*, Hind, *Tor elaga*, Tel, *Kawat*, Mar, *Theehaya za*, Burm a spinous shrub of dry hills in various parts of India, with a hard close-

C. decumana, Wild, the Shaddock or Pumelo.

The Rutaceæ have a very uniform structure. The wood is close and even-grained, generally white, with a yellowish tinge The pores are small, uniformly distributed, with a tendency to form radial lines. The medul- d equidistant. The wood of *Skimmia* is by extremely small pores, arranged in fine, very numerous medullary rays. The wood of most species is marked by white concentric lines, which are generally at unequal distances and often run into each other.

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A small tree. Sapwood white; heartwood dark brown, with a pleasant resinous smell, very hard, takes a beautiful polish. Pores very small, very numerous. Medullary rays short, very fine, uniformly distributed.

South India and Ceylon.

Weight, 55 to 67 lbs. per cubic foot.

Used as a substitute for sandalwood. The wood gives an oil used as a preservative for native boats.

		lbs.
D 1083.	North Arcot	55
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ORDER XXIII RUTACEÆ

A large Order, containing however few trees of any size, but generally shrubs or climbers, which are aromatic with gland dotted leaves

The Order is divided into 4 Tribes, *viz* —

Tribe I —Ruteæ	Only herbs such as the garden Rue, and the *Bonninghausenia*, so common in Himalayan forests
„ II —Xanthoxyleæ .	*Evodia*, *Melicope* and *Xanthoxylum*
, III —Toddalieæ .	*Toddalia* *Acronychia* and *Skimmia*
, IV —Aurantieæ .	*Glycosmis* *Micromelum*, *Murraya*, *Clausena*, *Triphasia*, *Limonia* *Luvunga*, *Paramignya* *Atalantia*, *Citrus*, *Feronia* and *Aegle*.

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uits, found in most part of
Bl , Hook Fl Ind i 501,
Nep , *Kambrong*, Lepcha,
ya Assam, Eastern Bengal,
yellowish white wood , and
87 a small Burmese shrub
which are *C pentaphylla*,
DC , Brandis 49 Vern *Rattanjote, surjmukha, teyrur*, Hind a deciduous shrub of the Sub Himalayan tract from the Jumna to Nepal and *C Willdenovii*, W and A., Hook Fl Ind i 506, Beddome xliv , Gamble 15 Vern *Mor kurangi*, Kaders, *Madanay* Nep , *Terhilnyok sidemnyok* Lepcha a small tree of the Sikkim Himalaya Western Ghats and Ceylon *Triphasia trifoliata* DC , Hook Fl Ind i. 507 Kurz i 192 is a small spinous garden shrub of South India and Burma *Limonia* contains 4 shrubs of India and Burma of which *L acidissima*, Linn , Hook Fl Ind i 507, Beddome xlv, Brandis 47 Kurz i 192 (*L crenulata*, Roxb Fl Ind ii 381) Vern *Beli*, Hind , *Tor elaga*, Tel , *Kawat* Mar , *Theehaya zi*, Burm a spinous shrub of dry hills in various parts of India, with a hard close-
limbing shrubs, one of Eastern
nignya, has 5 shrubs or climbers
st common is *P monophylla*,
e 15 Vern *Natkanta*, Nep ,
from Sikkim down to Tenas
urantium, Linn Vern *Narangi*,
naringi, Hind , *Kumla nebu* Beng , *Suntala*, Nep , *Kitchli*, Tam , *Kittali*, Tel.,
of India, but especially in Sikkim and Sylhet
17), *C medica* Linn the Citron, Lemon and
decumana Willd , the Shaddock or Pumelo.

The Rutaceæ have a very uniform structure The wood is close and even-grained, generally white, with a yellowish tinge The pores are small, uniformly distributed, with a tendency to form radial lines The medullary rays are fine, uniform and equidistant. The wood of *Skimmia* is anomalous, being distinguished by extremely small pores, arranged in oblique wavy tails, and by very fine, very numerous medullary rays The wood of most species is marked by white concentric lines, which are generally at unequal distances and often run into each other

1. EVODIA, Forst.

Contains 6 species of Indian small trees or shrubs. *E. viticina*, Wall.; Hook. Fl. Ind. i. 489; Kurz; i. 179, is a small tree of Tenasserim; *E. rutæcarpa*, Hook. f. and Th., a small tree of the inner valleys of Sikkim, between 7,000 and 10,000 feet; and *E. meliæfolia*, Bth., a small tree of Assam.

1. E. fraxinifolia, Hook. f.; Hook. Fl. Ind. i. 490; Gamble 13. Vern. *Kanukpa*, Nep.; *Kanú*, Lepcha.

A small tree. Bark smooth, light grey, $\frac{1}{10}$ inch thick. Wood white, soft. Pores small, often subdivided, numerous near the inner edge of each annual ring. Medullary rays short, moderately broad.

Eastern Himalaya in Sikkim, between 4,000 and 7,000 feet, Khasia Hills from 3,000 to 5,000 feet.

Growth fast, 4 to 6 rings per inch of radius. Weight, 21 lbs. per cubic foot. Wood used only for posts of huts. It comes up commonly in second growth forest, and the leaves, flowers and fruit when bruised, have a disagreeable aromatic smell.

	lbs.
E 3101. Darjeeling, 7,000 feet	21

2. E. Roxburghiana, Benth.; Hook. Fl. Ind. i. 487; Kurz i. 180. *E. triphylla*, Beddome xli. *Fagara triphylla*, Roxb. Fl. Ind. i. 416. *Xanthoxylum triphyllum*, Thwaites Enum. 69. Vern. *Nebede, lunuankenda*, Cingh.

A small tree. Wood greyish brown, moderately hard. Pores small, uniformly distributed. Medullary rays short, distant, fine to moderately broad.

Khasia Hills, South India and Ceylon, Tenasserim and the Andaman Islands.

Weight, 51 lbs., according to A. Mendis.

	lbs.
No. 60. Ceylon Collection	51

B 1979 collected by Kurz in the Andamans in 1866 and marked *E. triphylla*, DC. (Hook. Fl. Ind. i. 488; Kurz i. 180), has a soft pale red wood, with moderate-sized, oval, elongated and subdivided pores, and very fine and closely packed medullary rays.

2. XANTHOXYLUM, Linn.

A genus containing 10 small, rarely large trees or straggling or climbing shrubs, most of them of very little importance. Besides the one described: *X. acanthopodium*, DC.; Hook. Fl. Ind. i. 493; Kurz i. 181; Gamble 14. Vern. *Bogay timur*, Nep., is a small tree of the outer Himalaya from Kumaun to Sikkim and the Khasia Hills, ascending to 7,000 feet; *X. Rhetsa*, DC.; Hook. Fl. Ind. i. 495, Beddome xli. (*Fagara Rhetsa*; Roxb. Fl. Ind. i. 417) Vern. *Rhetsá mán*, Tel.; *Sessal*. Mar.; *Rattu kina*, Bingh. is a large tree of the Western and Eastern Ghâts of South India; and *X. Budrunga*, DC.; Hook. Fl. Ind. i. 495; Kurz i. 182. Vern. *Borjonali*, Ass.; *Mayaning*, Burm., is a tree of Eastern Bengal, Chittagong and Burma, with a rather heavy, soft, yellowish white, close-grained wood. The rest are shrubs or climbers.

1 X. alatum, Roxb. Fl. Ind. iii. 768; Hook. Fl. Ind. i. 493; Beddome xlii.; Brandis 47; Gamble 14. Vern. *Timbúr, timur, tezmal, dúrmúr*, Hind.; *Balay timur*, Nep.; *Sungrú*, Lepcha.

A shrub or small tree. Bark corky, young stems with thick conical prickles with a corky base. Wood close-grained, yellow. Pores small, often in radial lines, not uniformly distributed; belts with numerous pores often alternating with belts with scanty pores. Medullary rays fine, short, very numerous.

Outer Himalaya from the Indus to Bhutan, ascending to 7,000 feet, Khasia Hills.

making tooth brushes Fruit
to purify water The whole

			lbs
H	107	Bhajji Simla 4 000 feet	46
E	2329	Tukdah, Darjeeling 5 000 feet	34

3 TODDALIA, Juss

Contains two species one the rambling sarmentose shrub here described the other *T bilocularis* W and A Hook Fl Ind i 497 Beddome xl ii a handsome tree of the Western Ghats always unarmed and reaching 3 feet in girth

1 T aculeata, Pers, Hook Fl Ind i 497, Beddome xlii, Brandis 46, Kurz i 183, Gamble 14 *Scopolia aculeata,* Sm, Roxb Il Ind i 616 Vern *Kanj,* Hind, *Dahan, lahan,* Rajputana, *Meinkara* Nep, *Saphijuik* Lepcha, *Milkaranai,* Tam, *Kondakashinda,* Tel

A large scandent shrub, the branches covered with prickles Wood porous, yellowish white, soft Pores moderate sized, very numerous, often subdivided, uniformly distributed Medullary rays very fine, uniform and equidistant

Outer Himalaya from Kumaun eastwards Khasia Hills and Western Ghats ascending to 7 000 feet.

The root bark gives a yellow dye and a bitter and aromatic tonic used by natives in some parts of the country as a remedy for fever (*Bidie*)

E 2855 Tukdah Darjeeling 5 000 feet

4 SKIMMIA, Thunb

1 S Laureola, Hook f, Hook Fl Ind i 499, Brandis 50, Gamble 14 Vern *Nei, barru,* Pb, *Nehar, gurl pata,* Kumaun, *Chumlani,* Nep, *Timburnyok,* Lepcha

An extremely aromatic shrub Bark thin bluish grey Wood white, soft, with distinct, white, concentric lines which may possibly be annual rings, has an aromatic scent when fresh cut Pores extremely small, in narrow, irregularly bent lines Medullary rays fine, numerous

Himalaya from the Indus to Bhutan from 5 000 to 11 000 feet Afghanistan Weight, 42 lbs per cubic foot The leaves are eaten in the Himalaya in curries

			lbs.
H	2846	Mahasu, Simla 8 000 feet	..
E	2330	Tukdah Darjeeling 5 000 feet	42

6 MURRAYA, Linn

Besides the species described *M Konigii* Spr Hook Fl Ind i 503 Beddome xliv Brandis 48 Kurz i 190 Gamble 14 (*Bergera Konigii* Linn, Roxb Fl Ind ii 375) Vern *Gandla ganli bowala* Pb *Harri katnim* Hind *Barsanga,* Beng *Chaiangi* Hyderabad *Karepak kari vepa* Tel *Kariwepila* Tam is a small tree of the outer Himalaya from the Ravi to Assam Bengal South India and Burma whose leaves are used for flavouring curries The wood is close even grained, hard and durable and is used for agricultural implements

1. M exotica, Linn, Hook Fl Ind i 502, Roxb Fl Ind ii 374, Beddome xliv, Brandis 18, Kurz i 190, Gamble 14 Vern *Marchula, juti,* Hind, *Kamini,* Beng, *Naga golunga,* Tel, *Raket-berar,* Gondi, *Sinali,* Nep, *Shitkem,* Lepcha, *Makay,* Burm, *Machalla,* And

A shrub or small tree, with thin grey bark Wood light yellow, close grained, very hard, apt to crack Pores very small, sometimes

1. EVODIA, Forst.

Contains 6 species of Indian small trees or shrubs. *E. viticina*, Wall.; Hook. Fl. Ind. i. 489; Kurz; i. 179, is a small tree of Tenasserim; *E. rutæcarpa*, Hook. f. and Th., a small tree of the inner valleys of Sikkim, between 7,000 and 10,000 feet; and *E. meliæfolia*, Bth., a small tree of Assam.

1. E. fraxinifolia, Hook. f.; Hook. Fl. Ind. i. 490; Gamble 13. Vern. *Kanukpa*, Nep.; *Kanú*, Lepcha.

A small tree. Bark smooth, light grey, $\frac{1}{10}$ inch thick. Wood white, soft. Pores small, often subdivided, numerous near the inner edge of each annual ring. Medullary rays short, moderately broad.

Eastern Himalaya in Sikkim, between 4,000 and 7,000 feet, Khasia Hills from 3,000 to 5,000 feet.

Growth fast, 4 to 6 rings per inch of radius. Weight, 21 lbs. per cubic foot. Wood used only for posts of huts. It comes up commonly in second growth forest, and the leaves, flowers and fruit when bruised, have a disagreeable aromatic smell.

	lbs.
E 3101. Darjeeling, 7,000 feet	21

2. E. Roxburghiana, Benth.; Hook. Fl. Ind. i. 487; Kurz i. 180. *E. triphylla*, Beddome xli. *Fagara triphylla*, Roxb. Fl. Ind. i. 416. *Xanthoxylum triphyllum*, Thwaites Enum. 69. Vern. *Nebede*, *lunu-ankenda*, Cingh.

A small tree. Wood greyish brown, moderately hard. Pores small, uniformly distributed. Medullary rays short, distant, fine to moderately broad.

Khasia Hills, South India and Ceylon, Tenasserim and the Andaman Islands.

Weight, 51 lbs., according to A. Mendis.

	lbs.
No. 60. Ceylon Collection	51

B 1979 collected by Kurz in the Andamans in 1866 and marked *E. triphylla*, DC. (Hook. Fl. Ind. i. 488; Kurz i. 180), has a soft pale red wood, with moderate-sized, oval, elongated and subdivided pores, and very fine and closely packed medullary rays.

2. XANTHOXYLUM, Linn.

A genus containing 10 small, rarely large trees or straggling or climbing shrubs, most of them of very little importance. Besides the one described: *X. acanthopodium*, DC.; Hook. Fl. Ind. i. 493; Kurz i. 181; Gamble 14. Vern. *Bogay timur*, Nep., is a small tree of the outer Himalaya from Kumaun to Sikkim and the Khasia Hills, ascending to 7,000 feet; *X. Rhetsa*, DC.; Hook. Fl. Ind. i. 495, Beddome xli. (*Fagara Rhetsa*; Roxb. Fl. Ind. i. 417) Vern. *Rhetsá mán*, Tel.; *Sessal*, Mar.; *Rattu kina*, Bingh. is a large tree of the Western and Eastern Ghâts of South India; and *X. Budrunga*, DC.; Hook. Fl. Ind. i. 495; Kurz i. 182. Vern. *Borjonali*, Ass.; *Mayaning*, Burm., is a tree of Eastern Bengal, Chittagong and Burma, with a rather heavy, soft, yellowish white, close-grained wood. The rest are shrubs or climbers.

1 X. alatum, Roxb. Fl. Ind. iii. 768; Hook. Fl. Ind. i. 493; Beddome xlii.; Brandis 47; Gamble 14. Vern. *Timbúr*, *timur*, *tezmal*, *dúrmúr*, Hind.; *Balay timur*, Nep.; *Sungrú*, Lepcha.

A shrub or small tree. Bark corky, young stems with thick conical prickles with a corky base. Wood close-grained, yellow. Pores small, often in radial lines, not uniformly distributed; belts with numerous pores often alternating with belts with scanty pores. Medullary rays fine, short, very numerous.

Outer Himalaya from the Indus to Bhutan, ascending to 7,000 feet, Khasia Hills.

or making tooth brushes Fruit and to purify water The whole

			lbs
H	107	Bhajji Simla 4 000 feet	46
E	2329	Tukdah, Darjeeling 5 000 feet	34

3 TODDALIA, Juss

Contains two species one the rambling sarmentose shrub here described the other *T bilocularis* W and A Hook Fl Ind i 497 Beddome xliii a handsome tree of the Western Ghats always unarmed and reaching 3 feet in girth

1 T aculeata, Pers , Hook Fl Ind i 497, Beddome xlii , Brandis 46, Kurz i 183, Gamble 14 *Scopolia aculeata,* Sm , Roxb Fl Ind i 616 Vern *Kanj*, Hind , *Dahan, lahan*, Rajputana , *Meinkara* Nep , *Saphijirik,* Lepcha , *Milkaranai*, Tam , *Kondakashinda,* Tel

A large scandent shrub, the branches covered with prickles Wood porous, yellowish white, soft Pores moderate sized, very numerous, often subdivided, uniformly distributed Medullary rays very fine, uniform and equidistant

Outer Himalaya from Kumaun eastwards Khasia Hills and Western Ghats ascending to 7 000 feet.

The root bark gives a yellow dye and a bitter and aromatic tonic, used by natives in some parts of the country as a remedy for fever (*Bidie*)

E 2855 Tukdah Darjeeling 5 000 feet

4 SKIMMIA, Thunb

1 S Laureola, Hook f , Hook Fl Ind i 499, Brandis 50, Gamble 14 Vern *Nei, barru*, Pb , *Neh ir, gui l pata*, Kumaun , *Chumlani*, Nep , *Timburnyol*, Lepcha

An extremely aromatic shrub Bark thin bluish grey Wood white, soft, with distinct, white, concentric lines which may possibly be annual rings, has an aromatic scent when fresh cut Pores extremely small, in narrow, irregularly bent lines Medullary rays fine, numerous

Himalaya from the Indus to Bhutan from 5 000 to 11 000 feet Afghanistan Weight, 42 lbs per cubic foot The leaves are eaten in the Himalaya in curries

			lbs.
H	2846	Mahasu, Simla 8 000 feet	..
E	2330	Tukdah, Darjeeling 5 000 feet	42

6 MURRAYA, Linn

Spr Hook Fl Ind i 503 Beddome 4. (*Bergera Konigii* Linn Roxb Fl Pb *Harri katnim* Hind *Barsanga*, *ari vepa* Tel *Kamwepila* Tam is a small tree of the outer Himalaya from the Ravi to Assam Bengal South India and Burma whose leaves are used for flavouring curries The wood is close, even grained, hard and durable and is used for agricultural implements

1. M exotica, Linn , Hook Fl Ind. i 502, Roxb Fl Ind ii 374, Beddome xliv , Brandis 48, Kurz i 190, Gamble 14 Vern *Marchula, juti*, Hind , *Kamini*, Beng , *Naga golunga*, Tel , *Rakel berar*, Gondi , *Sinali*, Nep , *Shitkem*, Lepcha , *Makay*, Burm , *Uachalla*, And.

A shrub or small tree, with thin grey bark Wood light yellow, close grained, very hard, apt to crack Pores very small, sometimes

in short radial lines. Medullary rays fine, very numerous. Sharp, white, concentric lines, which frequently run into each other.

Outer Himalaya from the Jumna to Assam ascending to 4,500 feet, Behar, South India, Burma and the Andaman Islands.

Weight, 62 lbs. per cubic foot is the average of our specimens; Wallich gives 61 lbs. The wood resembles boxwood and has been tried for wood-engraving, for which it seems suitable if well seasoned; it is also used for handles of implements. It is often planted for ornament, and is sometimes called "Satinwood" at Port Blair.

		lbs.
B 3195.	Andaman Islands (Home, 1874, No. 24).	63
B 519.	Andaman Islands	62
No. 26.	Ceylon Collection	61

5. ATALANTIA, Correa.

Contains 5 small trees of South India and Burma. *A. racemosa*, W. and A.; Hook. Fl. Ind. i. 512; Beddome xlvi, is a small tree of South India and Ceylon; *A. caudata*, Hook. f.; Hook. Fl. Ind. i. 513, a shrub of the Khasia Hills; and *A. macrophylla*, Kurz i. 195, an evergreen tree of the coast forests of the Andamans.

1. A. monophylla, Correa; Hook. Fl. Ind. i. 511; Beddome xlvi.; Kurz i. 195. Vern. *Arawi nim*, Tel.; *Katyalu*, Tam.; *Makhur*, Mar.

Wood yellow, very hard and close-grained. Pores very small; in groups or short radial lines. Medullary rays very fine, numerous; the distance between the rays greater than the transverse diameter of the pores. Numerous white concentric lines at varying distances.

Eastern Bengal, Southern India and Ceylon.

Weight, 65 lbs. per cubic foot. Recommended by Kurz as a substitute for box-wood.

		lbs.
No. 10.	Salem Collection	65

2. A. missionis, Oliv.; Hook. Fl. Ind. i. 513; Beddome xlvi. *Limonia missionis*, Wall.; Thwaites Enum. 45. Vern. *Pambúrú*, Cingh.

Wood yellowish white, moderately hard, close-grained. Annual rings marked by a white line, and a belt of more numerous pores. Pores small, uniformly distributed. Medullary rays fine, wavy, very numerous, uniform, not equidistant.

South India and Ceylon.

Weight, 48 lbs. per cubic foot. The wood is used for furniture and cabinet work, it is sometimes variegated.

		lbs.
No. 66.	Ceylon Collection	48

7. FERONIA, Correa.

1. F. Elephantum, Correa; Hook. Fl. Ind. i. 516; Roxb. Fl. Ind. ii. 411; Beddome t. 121; Brandis 56; Kurz i. 198; Gamble 15. The Wood Apple. Vern. *Bilin, kait, kat-bél*, Hind.; *Kath-bel*, Beng.; *Vallanga, velá, kavít*, Tam.; *Velagá, elaka, yellanga*, Tel.; *Bilwar*, Kan.; *Kawat*, Mar.; *Hman*, Burm.

A large tree. Bark dark grey or nearly black. Wood yellowish white, hard. Annual rings distinctly marked by a white line. Pores small, in short radial lines, joined by short, narrow, white, concentric bands. Medullary rays short, white, prominent, fine and moderately broad, very numerous, not straight. Structure similar to that of *Ægle Marmelos* and *Cratæva religiosa*.

Sub-Himalayan forests from the Ravi eastwards, Bengal, South India, Chanda district in the Central Provinces

Weight 50 lbs per cubic foot, according to Skinner, No 74 19 according to Cunningham Value of P 623 (Cunningham), 615 (Skinner) The wood is used for house building, naves of wheels oil crushers and agricultural implements It gives a gum similar to gum arabic The pulp of the fruit is acid and is made into jelly

E 2487	Calcutta	

8 AEGLE, Correa

1. A. Marmelos, Correa, Hook Fl Ind i 516, Roxb Fl Ind 579, Beddome t 161, Brandis 57, Kurz i 198, Gamble 15 The Bael Tree Vern *Bel,* Hind, *Bela,* Beng, *Mahaka* Gondi, *Bela,* Kurku, *Vilva,* Tam, *Maredu, patir, marat,* Tel, *Bilapatri,* Kan, *Okshit,* Burm

A small tree, bark ½ inch thick, outer substance soft, grey, exfoliating in irregular flakes Wood yellowish white, hard, with a strong aromatic scent when fresh cut, no heartwood, not durable, readily eaten by insects. Pores small, uniformly distributed Medullary rays wavy, fine, short, white, numerous, uniform and equidistant Annual rings marked by *distinct lines, and often by a continuous belt of pores In some cases the* pores are more numerous in the autumn wood

Sub Himalayan forests from the Jhelam eastwards, Central and South India, Burma

Weight, 40 to 50 lbs (Brandis), Wallich gives 49, our specimens average 57 lbs

The tree is not often cut, as it is chiefly valued for its fruit the pulp of which is *used medicinally in diarrhœa and dysentery, as a sherbet and as a conserve keeping* well when dry The wood is used in construction for the pestles of oil and sugar-mills, naves and other parts of carts, and for agricultural implements

		lbs
P 441	Ajmere	
O 248	Garhwal (1868)	57
O 268	" "	60
C 1176	Abri Reserve Central Provinces	52
C 2785	Melghat Berar	62
E 2486	Calcutta	
E 638	Goalpara, Assam	53
B 564	Prome Burma	60

The structure of *Cratæva religiosa* is very similar to this, but the wood is much softer, and the pores are enclosed in patches of soft tissue

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Order XXIV SIMARUBEÆ

Contains eight genera of Indian trees or shrubs almost always with bitter bark. They belong to 2 Tribes, *viz*,—

Tribe I —Simarubeæ

" II —Picramnieæ

Harrisonia Bennettii, Hook, Hook Fl Ind i 519, Kurz i 203 Vern *Tapooben* Burm, is a small spinous tree of Burma *Brucea* contains two bitter shrubs *B sumatrana,* Roxb Fl Ind i 4
Tenasserim and the Andaman Islands, and
Gamble 15, of Sikkim Bhutan, Sylhet and Bur
is a small tree of Tenasserim

e of the West Indies

Wood white, soft (moderately hard in *Balanites*); no heartwood. Pores moderate-sized. Medullary rays moderately broad to very broad.

1. AILANTHUS, Desf.

Besides the two species described, *A. glandulosa*, Desf., is a lofty tree, indigenous in Japan, but occasionally planted both in Europe and in Northern India. It grows rapidly, throwing up abundant root suckers, and has for that reason been employed in plantations made to clothe barren stony hills in the south of France. It is also often employed as an avenue tree, and is cultivated in gardens.

1. A. malabarica, DC.; Hook. Fl. Ind. i. 518; Beddome t. 122; Brandis 58; Kurz i. 200. Vern. *Peru*, Tam., Tel.; *Dhúp, baga-dhúp, gogul-dhúp*, Kan.; *Matti pál*, Anamalais; *Kambalu, walbiling*, Cingh.

A large deciduous tree, with thick, rough bark. Wood white, very soft and spongy. Pores large, scanty, subdivided. Medullary rays short, moderately broad, the distance between the rays being larger than the transverse diameter of the pores.

Western Gháts, rare in Pegu. Often planted in South India for ornament.

Weight, 23 lbs. per cubic foot. Wood not used. The tree gives a gum resin which is used medicinally, especially in dysentery. For Mr. Broughton's report on an analysis of it see Beddome t. 122.

		lbs.
W 746.	South Kanara	23

2. A. excelsa, DC.; Hook. Fl. Ind. i. 518; Roxb. Fl. Ind. ii. 450; Beddome xlix; Brandis 58. Vern. *Arúa*, Meywar; *Maha rukh*, Hind., Mar.; *Peru, pee*, Tam.; *Pedu, pey, pedda*, Tel.; *Gormi-kawat*, Uriya.

A large tree. Wood soft, white. Structure similar to that of *A. malabarica*.

Central and Southern India. Often planted.

Weight, 28lbs. per cubic foot. Wood used to make floats for fishing, sword handles, spear sheaths and catamarans. The bark is aromatic and is used as a febrifuge and tonic.

		lbs.
C 2784.	Melghát, Berar	...
No. 4.	Salem Collection	28

2. SAMADERA, Gaertn.

2. S. indica, Gaertn.; Hook. Fl. Ind. i. 519; Thwaites Enum. 70; Beddome xlix; Kurz i. 200. Vern. *Samadara*, Cingh.; *Kathai*, Burm.

A small tree. Wood light yellow, soft, no heartwood. Pores small; scanty. Medullary rays very fine, uniform, closely packed.

South India and Ceylon.

Weight, 26 lbs. per cubic foot. The bark is used as a febrifuge.

		lbs.
No. 76.	Ceylon Collection	26

3. PICRASMA, Bl.

B 1977. collected by Kurz in the Andamans in 1866 and marked *P. javanica*, Bl. Vern. *Thityooben*, Burm., has a soft, white wood. Pores small, uniformly distributed, joined by fine, concentric lines. Medullary rays short and fine. Weight, 27 lbs. per cubic foot.

Besides this species, *P. nepalensis*, Benn. is a small tree of Nepal and the Khasia Hills, and *P. quassioides*, Benn.; Hook. Fl. Ind. i. 520; Brandis 59, Vern. *Tuthai*,

tithu, hala, Pb , *Charangi,* Hind , is a tall shrub of the outer Himalaya from the Chenab to Nepal, occasionally ascending to 8,000 feet, with a bitter bark, which is used as a substitute for quassia

4 BALANITES, Delile.

1. B. Roxburghii, Planch , Hook Fl Ind i. 522 , Brandis 59 , Kurz i 204 *B. ægyptica,* Delile , Beddome l *Ximenia ægyptiaca,* Roxb Fl Ind ii 253 Vern *Hingu, ingua, hingol, hingota,* Hind , *Garrah,* Gondi , *Gari, ringri,* Tel. , *Nanjunda,* Tam , *Hingan,* Mar

A small tree, with grey bark, ¼ inch thick Wood yellowish white, moderately hard, no heartwood, no annual rings Pores small or moderate-sized, distributed in irregular bands and groups Medullary rays short, very broad , on a radial section visible as narrow plates, with a few fine ones intervening

Drier parts of India and Burma

Weight, 48lbs per cubic foot Wood used for walking sticks and for fuel From the seed a fixed oil is expressed The seeds bark and leaves are used in native medicine, and the kernel of the fruit, filled with gunpowder, in fireworks

		lbs
P 450	Ajmere . .	48
C 1171	Ahiri Reserve, Central Provinces . .	...

Order XXV OCHNACEÆ.

Contains two genera
Ochna is described below
Hook Fl. Ind i 525, Be , , -
trana, Jack, of the sea coast of Tenasserim

Wood red or brown , grain close, but twisted. Pores small or very small, uniformly distributed Medullary rays moderately broad

1. OCHNA, Linn

Besides the three species described, *O pumila,* Ham , is a small undershrub of the Sub-Himalayan tract, principally in sal forests, with a perennial underground stem throwing up annually, after the jungle fires, stems 2 to 3 feet high, bearing handsome yellow flowers

1. O. squarrosa, Linn , Hook. Fl Ind i. 523 , Roxb. Fl Ind ii 643 , Beddome l , Brandis 60. Vern. *Sunari, yerra-juvi,* Tel , *Narole, mudah,* Kan , *Komari,* Uriya

A shrub or small tree Wood reddish brown, moderately hard, close-grained Pores very small, very numerous, between the moderately broad, but not very prominent medullary rays, which are clearly visible on a radial section

Bengal, Burma and South India.

Weight, 51lbs per cubic foot

		lbs.
C 1305	Gumsúr	51

2. B. 1978 collected by Kurz in 1866 in the Andaman Islands and marked *O andamanica,* Kurz, has a red, hard wood, with the medullary rays prominent on a radial section, similar in structure to that of *O squarrosa* Weight, 58 lbs per cubic foot

3. O. Wallichii, Planch; Hook. Fl. Ind. 524; Kurz i. 205. Vern. *Yodayah*, Burm.

A deciduous tree. Wood light brown, hard, close-grained. Pores small, uniformly distributed. Medullary rays fine and moderately broad, prominent on a radial section.

Burma.

Weight, 54 lbs. per cubic foot.

		lbs.
B 3132.	Burma (1862)	54

Order XXVI. BURSERACEÆ.

Contains seven genera of Indian trees, often resinous. They all belong to the Tribe *Burvereæ, viz.*: *Protium*, *Boswellia*, *Garuga*, *Balsamodendron*, *Bursera*, *Canarium* and *Filicium*. *Protium* contains two South Indian trees: *P. caudatum*, W. and A.; Hook. Fl. Ind. i. 530; Beddome t. 125. Vern. *Konda mamidi*, Tel.; *Kilevay, niluve*, Tam.; *Konda mávu*, Kan., a deciduous tree with green bark, often used for planting in avenues; and *P. pubescens*, W. and A., a small tree, resembling the former species.

Wood marked by fine distant medullary rays, and small or moderate-sized, uniformly distributed pores.

1. BOSWELLIA, Roxb.

1. B. thurifera, Colebr.; Roxb. Fl. Ind. ii. 383; Beddome lii.; Brandis 61. *B. serrata*, Roxb.; Hook. Fl Ind. i. 528. *B. glabra*, Roxb.; Beddome t. 124. Vern. *Salhe, salei, sálgá*, Hind.; *Gúggar, dúmsal*, Kumaon; *Salla, bor-salei, ganga*, Gondi; *Luban, salai*, Beng.; *Kungli, gúgúlu, kúndrikam, morada*, Tam.; *Anduku, anduga, parangi*, Tel.; *Chittu*, Kan.

A moderate-sized, often gregarious tree. Bark ½ inch thick, yellow, sometimes greenish yellow, exfoliating in small, hard, irregular flakes and thin plates of much larger size. Wood rough, white when fresh-cut, darkening on exposure, moderately hard. Pores moderate-sized, often subdivided. Medullary rays fine and moderate; on a radial section distinctly visible as long narrow plates.

Intermediate, northern and southern dry zones, Sub-Himalayan tract from the Sutlej to Nepal, drier forests of Central and Southern India.

Weight, 30 to 35 lbs. per cubic foot (Brandis); our specimens give 32 lbs. Wood not durable, but it has been reported that 5 sleepers made of it and soaked for some time in a tank filled with the leaves of *Bahera (Terminalia bellerica)* and water and put down in June 1876 on the Holkar and Neemuch State Railway are still perfectly sound and good. (Indore Forest Report, 1876-77, quoted in *Indian Agriculturist* of May 1878.) It is used for fuel and for making charcoal, which in Nimar is used for iron smelting. From wounds and cracks in the bark it gives a transparent, fragrant, green resin, having an agreeable scent when burnt. It is used medicinally as a diaphoretic and astringent, to make ointment for sores, and as incense (*Labanu, kúndúr, kúndúra, kúndrikam*), but is not the true frankincense, which is the produce of a tree of the Somali country and Arabia. (Birdwood in Linn. Trans. xxvii, p. 146. Cooke's Report on the Gums, Resins, Oleo-resins and Resinous Products in the India Museum, p. 81, 1874.)

		lbs.
P. 3215.	Nagpahar, Ajmere	...
C 1112.	Ahiri Reserve, Central Provinces	36
C 2780.	Melghát Forest, Berar	28

2. GARUGA, Roxb.

1. G. pinnata, Roxb. Fl. Ind. ii. 400; Hook. Fl. Ind. i. 528;

Beddome t. 118; Brandis 62, Kurz i. 207, Gamble 15. Vern. *Kharpat, katúla, kilmira, sarola*, Pb., *Ghogar, kaikar*, Hind.; *Gurja*, Banda, *Kukar, kaikra, ghunja, mahárut*, C P, *Júm, kharpat, nil bhadi*, Beng, *Mohi*, Uriya, *Gia*, Mechi, *Dabdabbi*, Nep., *Mal tit*, Lepcha; *Gendeli poma*, Ass, *Chitompa*, Gáro, *Mroung-shisha*, Magh, *Garuga, gárgá*, Tel; *Gúpni, kekra*, Gondi, *Kekkeda*, Kuiku, *Karre vembu*, Tam, *Kúrúk*, Mar; *Chinyok*, Burm.

A large deciduous tree. Bark 1 inch thick, soft, red inside, grey or brown outside, exfoliating in large irregularly shaped scales; sapwood large, heartwood reddish, moderately hard. Pores large, not numerous. Medullary rays short, moderately broad, on a radial section visible as narrow horizontal plates

rds, Central and South India,

cubic foot The specimens here of 40 lbs This is, very likely, but it seasons well It is used s used for tanning and the leaves . The fruit is sometimes eaten

			lbs
O	225	Garhwal (1868)	39
O	316	Gorakhpur (1868)	39
C	1107	Chanda, Central Provinces	39
E	648	Darjeeling Terai	39
E	1389	Chittagong	46
B	812	Burma	39

3. BALSAMODENDRON, Kunth.

Contains four species of balsamiferous, often spiny shrubs or trees Besides ains *B pubescens*, Stocks, Hook Fl Ind. luch, a small tree of Beluchistan and the far south as Karachi It yields a small gum, almost entirely soluble in water. Brandis 65, Beddome t 126, is a tree of nt It is very fragrant and gives a *la*, Beng, is a small tree of Easter h' is the gum-resinous exudation of Arabia and the African coast of the Red Sea.

1. B. Mukul, Hook. Fl. Ind. i. 529; Brandis 64 Vern. *Gúgal*, Sindi.

A small tree, bark greenish yellow, peeling off in long thin, shining paper-like scrolls. Wood soft, white. Pores small. Medullary rays fine, short.

Arid zone, Sind, Kattywar, Rajputana, Khandesh

elds a gum called n the bark, and is

			lbs.
P	418	Ajmere	
P	2919	Rajputana	20
P	3238	Dewair, Ajmere	...

4. BURSERA, Linn.

1. B. serrata, Colebr.; Hook Fl. Ind. i. 530, Brandis 61, Kurz i. 208. Vern. *Murtenga*, Ass.; *Thadee-ben*, Burm.

A large evergreen tree. Wood hard, sapwood light brown, heartwood red, close-grained. Pores small, uniformly distributed. Medul-

lary rays fine, red; on a radial section distinctly visible as narrow dark bands.

Eastern moist zone, Bengal, Assam, Chittagong and Burma.
Weight, 46 lbs. per cubic foot. Wood good for furniture.

			lbs.
B	313.	Burma (1867)	46
B	2225.	Andamans (similar in structure, but wood lighter and softer)	37

5. CANARIUM, Linn.

Contains 4 large resinous trees of Southern India, Eastern Bengal and Burma. *C. strictum*, Roxb.; Hook. Fl. Ind. i. 534; Beddome t. 128, is the Black Dammer Tree, Vern. *Karapu kongiliam*, Tam.; *Manda dhúp*, Kan.; *Thelli*, Mal., a tall tree of Southern India, giving a brilliant black gum used medicinally and for other purposes (for Mr. Broughton's analysis of it, see Beddome under t. 128). *C. euphyllum*, Kurz, i. 208 and *C. coccineo-bracteatum*, Kurz, i. 209 are large trees of the Andaman Islands.

1. C. bengalense, Roxb. Fl. Ind. iii. 136; Hook. Fl. Ind. i. 534; Kurz i. 209; Gamble 15. Vern. *Goguldhúp*, Nep.; *Narockpa*, Lepcha; *Tekreng*, Gáro; *Bisjang*, *dhúna*, Ass.

A tall tree with straight cylindrical stem. Bark light coloured, hard, thin, rough with horizontal wrinkles. Wood shining, white when fresh cut, turning grey on exposure, soft, even-grained, does not warp, but decays readily. Pores scanty, large, often oval and subdivided, prominent on a vertical section. Medullary rays fine, white; on a radial section distinctly visible, giving the wood a mottled appearance.

Eastern moist zone, eastern Himalaya, Bengal and Burma.
Weight, 28 lbs. per cubic foot. The wood is much esteemed in Bengal for tea-boxes, and it is also used for shingles. The tree yields a resin which is used as incense; it is clear, amber-coloured and brittle.

			lbs.
E	703.	Great Rangít Valley, Darjeeling, 3,500 feet	28

6. FILICIUM, Thwaites.

1. F. decipiens, Thwaites Enum. 59; Beddome t. 129; Hook. Fl. Ind. i. 539. Vern. *Katu puveras*, Tam.; *Pehimbia*, Cingh.

A tree with elegant fern-like leaves. Heartwood red, moderately hard. Pores small, in groups or short radial lines. Medullary rays fine, numerous, at unequal distances.

Western Ghâts up to 4,500 feet, Ceylon.
Weight, 68 lbs. per cubic foot (A. Mendis). Wood strong, valuable for building.

		lbs.
No. 70.	Ceylon Collection	68

ORDER XXVII. MELIACEÆ.

An Order containing about 20 trees or shrubs, chiefly of the moist zones.
The Order is divided into 4 Tribes, *viz.*:—

Tribe	I.—Melieæ	*Turræa*, *Naregamia*, *Munronia*, *Melia* and *Cipadessa*.
„	II.—Trichilieæ	*Dysoxylum*, *Chisocheton*, *Sandoricum*, *Aglaia*, *Lansium*, *Amoora*, *Walsura*, *Heynea*, *Beddomea*, and *Carapa*.
	III.—Swietenieæ	*Soymida*, *Chickrassia*, and *Swietenia*.
„	IV.—Cedreleæ	*Chloroxylon* and *Cedrela*.

Of these 20 g nera 10 are described here The remaining 10 are of much less importance *Turræa virens* Linn *T villosa* Benn and *Naregamia alata*, W and A are shrubs of Southern India *Munronia Wallichii* Wight is a shrub of the Eastern Himalaya and the Nilgiris, *Cipadessa fruticosa* Bl, Hook Fl Ind i 545 (*Mallea Rothii* Adr Juss Beddome liv *Ekebergia indica* Roxb Fl Ind ii 392) Vern *Nal bilá* Hind *Chendbera purvidona* Tel is a small tree of the western coast, used for fuel *Chisocheton* contains 3 evergreen trees *C grandiflorus* Kurz i 216 Vern brown, rather heavy, hard and close grained wood 215 are from Burma while *C paniculatus* Hiern 216 (*Guarea paniculata* Roxb Fl Ind ii. 242) V of the Khasia Hills and Eastern Bengal *Aglaia* contains about 10 species chiefly Burmese or East Himalayan trees among which *A Roxburghiana* W and A Hook Fl Ind i 555 Beddome t 130, a large tree of the Western Ghats with a strong useful timber, and *A edulis* A Gray Hook Fl Ind i 556, Gamble 16 (*Milnea edulis*, Roxb Fl Ind i 637) Vern *Lati mahwa* Nep *Sinakadang* Lepcha, *Gumi*

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tree of

Khasia

a tree of the Western

the species are among

Wood red (yellow in *Chloroxylon*, dark reddish brown in *Soymida*) Heartwood generally hard and dark coloured, not distinct in *Cedrela*, in several species of *Melia* and *Dysoxylon* Pores varying in size, often subdivided, always prominent on a vertical section Medullary rays fine, numerous and sharply marked in *Chloroxylon*, *Sandoricum* and *Melia*, broader and often less prominent in the other genera Concentric bands of softer texture in *Amoora Rohituka* and *Walsura robusta*

I MELIA, Linn

Besides the three species the wood of which is here described *M excelsa* Jack, Hook Fl Ind i 544 Kurz i 212, and *M birmanica*, Kurz i 213 Vern *Thu ta ma kha*, Burm, are evergreen trees of Burma

The wood of *M dubia* and *M Azedarach* resembles that of *Cedrela* in structure, but differs in having fine and numerous medullary rays *M indica* has a distinct heartwood, which is hard and close grained, but the pores and medullary rays are similar to those of the two species first named

1 M indica, Brandis For Fl 67 *M Azadirachta*, Linn, Hook Fl Ind i 544, Roxb Fl Ind ii 394, Beddome t. 13 (14 by mistake), Kurz i 212 The Neem or Margosa Tree Vern *Azad-darakht*, *neb*, Pers, *Nim*, Hind, *Betain*, Kumaon, *Agas*, Palamow, *Limbo*, C P, *Kohumbā*, Guz, *Nimuri*, Sindi, *Veypam*, Tam, *Tapa*, *yepa*, *taruka*, *vempa*, Tel, *Limb*, *nimbay*, Mar, *Bevina*, *bévu*, *heb bevu*, Kan, *Thimbauta ma-kha*, Burm

A large tree Bark grey, with numerous scattered tubercles Sapwood grey, heartwood red, very hard Annual rings doubtful the wood shews alternating bands with numerous and with fewer pores, also white concentric lines, whether these are annual rings is a matter for further enquiry Pores moderate sized and large, often oval and subdivided, visible on a vertical section Medullary rays fine, numerous

white, prominent, bent outwards where they touch the pores; the distance between the rays less than the transverse diameter of the pores.

Planted and self-sown throughout the greater part of India and Burma.

The weight and transverse strength have been determined by the following experiments:—

		Weight.	Value of P.
Puckle in 1859, three experiments, with bars 2' × 1" × 1",	found	49 lbs.	539
Skinner in 1862, No. 19	„	50 „	720
Cunningham in 1851, two experiments, with bars 2' × 1" × 1",	„	52 „	587
Fowke in Catalogue, South Kensington Museum, 1859	„	45 „	315
Wallich	„	46 „	...
Smythies in 1878, the mean of our three specimens	„	53 „	...

The wood is used for the construction of carts, in ship-building and for making agricultural implements, and in South India for furniture. It is held sacred by Hindus, and idols are made of it. The bark is bitter and is used as a febrifuge. The leaves are made into a poultice for ulcers. The gum is clear, amber-coloured and used as a stimulant. The seeds are employed to kill insects and for washing the hair. The fruit gives a fixed, acrid, bitter, yellow-coloured oil which is used to burn, but smokes badly in burning: it is also used in medicine as an antiseptic and anthelmintic.

		lbs.
P 463.	Ajmere (sapwood)	48
D 1053.	Salem, Madras	53
No. 11.	Salem Collection	59

2. **M. Azedarach**, Linn.; Hook. Fl. Ind. i. 544; Roxb. Fl. Ind. ii. 395 (also *M. sempervirens*, Sw.); Beddome t. 14 (13 by mistake); Brandis 68; Kurz i. 212; Gamble 16. The Persian Lilac, Bastard Cedar or Bead Tree. Vern. *Chein, kachein*, Sutlej; *Drek, bakain, bakáyan, betain, deikna, bakarja*, Hind.; *Maha limbo, malla ním, muhli*, C. P.; *Bakainú*, Nep.; *Mallay vembu*, Tam.; *Taraka vepa, makáním*, Tel.; *Bévu, chik bévu*, Kan.; *Ta-ma-kha*, Burm.

A tree with smooth grey bark. Sapwood yellowish white; heartwood soft, red. Annual rings marked by a broad belt of large pores, the outer part of each annual ring containing a few smaller-sized pores which are joined by irregular, wavy, concentric bands of soft tissue. Medullary rays moderately broad; visible on a radial section as long rough plates. Pores very prominent on a longitudinal section.

Commonly cultivated throughout India, and believed to be indigenous in the outer Himalaya, Siwalik tract and the hills of Beluchistan.

Growth rapid, 3 to 4 rings per inch of radius; it coppices freely. Weight, 30 lbs. according to Skinner, No. 92; *our specimens give an average of 38 lbs.* Skinner gives the value of P at 596.

Wood used for furniture. Beddome, Brandis and Kurz all say it warps and splits, but Mr. Halsey of Madhopúr writes to say that it is equally useful either green or seasoned. Our specimens split only very slightly, and we are inclined to think it is better than it has been supposed to be. The wood is very handsomely marked and polishes well. The bark is extremely bitter and is employed as an anthelmintic. The fruit yields an oil, and the nuts are frequently strung as beads. The leaves and pulp of the fruit are used in native medicine.

		lbs.
P 146.	Sainj, Giri Valley, Punjab	38
P 946.	Lahore, Punjab	35
P 1201.	Madhopúr, Punjab	40

3. **M. dubia**, Cav.; Hook. Fl. Ind. i. 545. *M. composita*, Willd.; Beddome t. 12; Brandis 69; Gamble 16. *M. superba* and *M. robusta*, Roxb. Fl. Ind. ii. 396-7. Vern. *Eisúr, limbarra, nímbarra*, Bombay; *Lapshi*, Nep.; *Dingkurlong*, Khasia Hills; *Mallay vembu*, Tam.; *Bévu, betta bévu, kád bévu*, Kan.

A large deciduous tree, with smooth, dark-brown bark Sapwood grey, heartwood reddish white, soft Pores large, generally round, visible on a vertical section Medullary rays white, fine, scanty, prominent on a radial section The structure resembles that of Toon, but all the pores are of the same size and the wood is softer. The annual rings are marked by more numerous, but not larger pores

Eastern Himalaya South India, Ceylon and Burma

Growth rapid, 2 to 3 rings per inch of radius in the Madras specimen, that from Bengal was moderate, 7 rings per inch Roxburgh says that a tree of *M robusta* grown in the Calcutta Botanic Gardens from Malabar seed produced in 7 years trees 46 feet high with a girth of 44 inches at 4 feet from the ground, which is equivalent to about 1 ring per inch of radius Also that another, of *M superba*, from seed sent by Dr Berry from Sunda reached in 6 years a heig of 48 inches Weight, 26 to 33 lbs per cubic foot The wood will probably be found useful for tea- tree should be cultivated on account of its rapid growth

			lbs
E	705	Great Rangit Valley, Darjeeling	33
D	1093	Madura, Madras	26
No	49	Ceylon Collection	26

-ingtonia speciosa similar to that of n Islands

2 DYSOXYLUM, Blume

Besides the three species here described the following occur in India *D grande*, Hiern, Hook Fl Ind i 547, a tree of Sylhet, *D pallens* Hiern, Hook Fl Ind i 548, a tree of Sikkim and the Khasia Hills, *D malabaricum*, Bedd, Hook Fl ... rn *Porapá* Kaders, and *D Bed-* hern India The leaves of several s are compound, with oblique often containing large brightly coloured seeds

Wood reddish, rough, moderately hard Pores prominent on a vertical section, moderate sized to large, often subdivided.

1. D. binectariferum, Hook f, Hook Fl Ind i 546, Kurz i 215, Gamble 16 *D macrocarpum*, Bl, Beddome liv, t 150. *Guarea binectarifera*, Roxb Fl Ind. ii 240 Vern *Katongzu*, Lepcha, *Rangi-rata*, Cachar, *Borogotodhara*, Ass

A large evergreen tree Wood reddish-grey, rough and close-grained, hard Pores large and moderate-sized, often subdivided Medullary rays moderately broad, red, wavy, irregularly distributed, the distance between the rays generally larger than the transverse diameter of the pores

Sikkim ascending to 2,000 feet, Assam, Khasia Hills, Chittagong and the Western Ghats

Weight, our specimens give 41 lbs. per cubic foot. Wood worthy of notice Kyd (*Guarea Gotodhara*, Ham.) gives 40 o and P = 200

			lbs
E	611	Khyrbari Forest, Darjeeling Terai	41

2. D procerum, Hiern, Hook Fl Ind i. 547, Kurz i. 214. Vern *Dinjori*, *govorpongyota* (Wall), Ass

An evergreen tree. Wood bright red, moderately hard. Pores large,

1. A. Rohituka, W. and A.; Hook. Fl. Ind. i. 559; Beddome t. 132; Brandis 69; Kurz i. 220; Gamble 16. *Andersonia Rohituka,* Roxb. Fl. Ind. ii. 213. Vern. *Rohituka,* Sans.; *Harin harra, harin khana,* Hind.; *Sohága,* Oudh; *Tikta-raj, pitraj,* Beng.; *Bandriphal,* ... *ta amari, amora amari,* Ass.; *Okhioungza,* ... Mal.; *Thitnee,* Burm.

... in grey bark. Wood reddish, close and ... nall and moderate-sized. Medullary rays ... l equidistant, distinctly visible on a radial section. Pores joined by reddish, soft, wavy, concentric lines. The concentric bands in this species are remarkable, as they are absent from the two other species here described.

Oudh, Assam, Northern and Eastern Bengal, Western Ghâts and Burma.

... are sometimes made of it. In Ben...

			lbs.
O 1362	Gonda, Oudh	. . . .	42
E 2331.	Mangwa, Darjeeling, 6,000 feet	. . . .	36
E 1261.	Tezpúr, Assam	. . . .	39
E 711.	Chittagong	. . . .	45

2. A. cucullata, Roxb.; Hook. Fl. Ind. i. 560; Beddome lv.; Kurz i. 221. *Andersonia cucullata,* Roxb. Fl. Ind. ii. 212. Vern. *Amúr, latmi, natmi,* Beng.; *Thitnee,* Burm.

A moderate-sized evergreen tree, with thin grey bark. Wood red, hard, close-grained, but apt to split. Pores small and moderate-sized. Medullary rays very fine, uniform, very numerous.

... ed for posts and other purposes in Lower Be...

			lbs.
E 414.	Sundarbans	. . . .	41

3. A. spectabilis, Miq.; Hook. Fl. Ind. i. 561; Kurz i. 221. Vern. *Amari,* Ass.

An evergreen tree. Wood red, hard, close-grained. Pores moderate-sized and large, often oval and subdivided, distinctly visible on a longitudinal section. Medullary rays fine, uniform, equidistant, prominent on a radial section, the distance between them less than the traverse diameter of the pores.

... takes a good polish. Used for boat-building and ... Kyd's *Guarea (Amari).* Weight, 47 lbs. P=792.

			lbs.
E 1255.	Tezpúr, Assam	. . . .	49
E 2192.	Nowgong, Assam	. . . .	48

5. WALSURA, Roxb.

B 1986 is a specimen collected by Kurz in the Andaman Islands in 1866, marked *Walsura robusta,* Roxb.; Hook. Fl. Ind. i. 565; Kurz. i. 223. Vern. *Upphing,* Sylhet; *Gyopho, tsoukmayba,* Burm. Wood light red, very hard. Pores small, joined by numerous ... ent, w... concentric lines. Medullary rays very fine, ... per cubic foot.

taken from an article in the

Ina

at 3 feet from ground —

No 1	90 inches	Height, 80 to 100 feet	
„ 2	77 „	Average girth, 88 inches	
„ 3	72 „		
„ 4	101 „		
„ 5	101 „		

Trees planted in 1839 measured in May 1873, at 3 feet from ground —

No 1	57 inches	Height, 55 feet
„ 2	40 „	„ 50 „

Trees planted in 1842 43 *measured in May 1873, at 3 feet from ground* —

No 1	40 inches.	Height, 50 to 70 feet.
„ 2	33 „	
„ 3	24 „	

The first five vary from 3 to 4 rings per inch of radius, averaging 3 41 rings
„ *second pair* „ „ *4 to 6* „ „ „ „ *4 78* „
„ third three „ „ 5 to 8

from which it would seem that the g
1827 28 and 1839 trees were from plan
taken at 47 and 36 years respectively,
consequently 30 years old Taking th
have a mean growth of 4 94 rings p
age of 58 years corresponding to a gi
faster than this, as the Calcutta average
6 feet.

The weight of Mahogany varies much Tredgold gives for Honduras wood
53 lbs, and Fowke gives 52 lbs as the weight of
cut from one of the trees destroyed in the 1864
es for the value of P for Honduras wood 637,
gives for Jamaica wood 516 Laslett s experi-
ments give the

	Weight	Value of P
Cuba Mahogany, 6 experiments, bars 7′×2″×2″ (6 feet between supports)	48 lbs	642
Honduras Mahogany, 6 experiments, bars 7′×2″×2″ (6 feet between supports)	41 „	601
Mexican Mahogany, 6 experiments, bars 7′×2″×2″ (6 feet between supports)	42 „	587

The difficulty
seeds In the Saharanpur gardens the trees, as stated above, have never seeded As far as it is now known one or two trees in private gardens near Barrackpore, and two *or three trees belonging to Government on the Barrackpore road have been seeding* occasionally for many years past One tree in the Barrackpore Park, and an old damaged and gnarled tree in the Calcutta Botanic Gardens, which however, was *blown down in the cyclone of 1864, have also seeded, but not freely Whenever these* trees did seed,

All attemp failed It has, however, been pr layers, and trees raised from layers are believed to be much early than seedlings, but from their tendency to form low branching bushes, it is feared that they will not yield much valuable timber It has therefore, been found necessary to depend upon the West Indies for supplies of seed as yet, and for some years past supplies have been received and the seedlings regularly distributed, chiefly in Bengal.

		lbs
E 1361	Calcutta Botanic Gardens	15

8. SOYMIDA, Adr. Juss.

1. S. febrifuga, Adr. Juss.; Hook. Fl. Ind. i. 567; Beddome t. 8; Brandis 71; Kurz i. 228. *Swietenia febrifuga,* Willd.; Roxb. Fl. Ind. ii. 398. Indian Red Wood. Vern. *Rohan,* Hind.; *Rohina,* Beng.; *Shem, wond,* Tam.; *Sumi,* Tel.; *Sohan,* Uriya; *Soimi,* Gondi; *Royta,* Bhil.

A large deciduous tree. Bark ⅓ to ½ inch thick, bluish grey or dark brown. Sapwood small, whitish; heartwood extremely hard and close-grained, reddish black, very durable. Pores moderate-sized, scanty. Medullary rays moderately broad, distinctly visible on a radial section as dark, shining, horizontal plates. Numerous fine, concentric lines of lighter colour, often closely packed and forming broader bands.

Central India and Dekkan.

Weight, according to Skinner, No. 117, and Fowke, 66 lbs.; R. Thompson gives 71, and Bombay specimens gave 76; Wallich (*Swietenia febrifuga*) 55 lbs.; our specimens give an average of 73·5 lbs. According to Skinner's experiments, the value of P is 1024, Fowke gives 626. The wood is durable. Skinner says that a piece taken out of the workshop at Fort Saint George, which had been erected in 1803 and pulled down in 1859, stood 1,232 lbs. without breaking a scantling 3′ × 1½″ × 1½.″ It is not much attacked by white ants. It is used for construction, well-work, ploughshares and oil-mills. The bark is bitter, and is used as a febrifuge and in diarrhœa and dysentery.

		lbs.
C 194.	Mandla, Central Provinces, 1871	73
C 1123.	Ahiri Reserve, Central Provinces	72
C 1240.	Gumsúr, Madras	74
D 2113.	Mysore	75

9. CHICKRASSIA, Adr. Juss.

Besides these species, Kurz describes *C. velutina,* Roemer. Vern. *Yimmah,* as occurring in Pegu.

1. C. tabularis, Adr. Juss.; Hook. Fl. Ind. i. 568; Beddome t. 9; Brandis 73; Kurz i. 227. *Swietenia Chickrassa,* Roxb. Fl. Ind. ii. 399. Chittagong Wood. Vern. *Chikrassi,* Beng.; *Boga poma,* Ass.; *Aglay, agal, eleutharay,* Tam.; *Madagari vembu,* Tel.; *Ganti malle,* Salem; *Dalmara,* Kan.; *Pabba,* Mar.; *Main,* Hyderabad; *Saiphra, sey barasi,* Magh; *Chegarasi* Chakma; *Yimmah, yengma,* Burm.; *Arrodah,* And.

A large tree. Bark reddish brown, deeply cracked. Heartwood hard, varying from yellowish brown to reddish brown, with a beautiful satin lustre, seasons and works well; sapwood of a lighter colour. Pores moderate-sized, often oval and subdivided, isolated, uniformly distributed. Medullary rays fine, uniform, mostly equidistant, slightly undulating; the distance between the rays generally equal to the transverse diameter of the pores. Annual rings distinctly marked by a sharp line.

Eastern Bengal, Assam, Chittagong, Burma and South India.

Growth, moderate, 8·6 rings per inch of radius. Weight, according to Skinner, No. 46, 42 lbs.; our specimens give an average of 45·5 lbs. Skinner's experiments give P = 614. The wood is used for furniture and for carving. The bark is a powerful astringent, and the flowers give a red or yellow dye.

		lbs.
E 1260.	Tezpúr, Assam	40
E 2197.	Nowgong, Assam	45
E 1401.	Chittagong	49
W 764.	South Kanara	43
W 1218.	North Kanara	44
B 2516.	Burma (1862)	52

10 CHLOROXYLON, DC

1 C Swietenia, DC , Hook Fl Ind i 569, Beddome t 11, Brandis 74 *Swietenia Chloroxylon*, Roxb Fl Ind ii 400 Satin Wood Vern *Behra, girya, behru bhiri*, C P , *Mududad*, Tam , *Billu, bilgu*, Tel , *Burus, purush*, Tam , *Behru*, Uriya, *Halda, bheria*, Mar , *Huragalu*, Mysore , *Burute, mal burute*, Cingh

A moderate sized deciduous tree Bark $\frac{1}{3}$ inch thick, soft, spongy, light grey or yellow Wood very hard, yellowish brown, the inner wood of a darker colour, but no distinct heartwood, with a beautiful satiny lustre, seasons well Annual rings distinct Pores very small Medullary rays fine, uniform and equidistant, very numerous, distinctly visible on a radial section as shining irregularly shaped plates, the distance between the rays is greater than the transverse diameter of the pores

Central and South Ind a a d Ceylon

Growth slow 16 rings per inch of radius The following experiments have been made to determine the weight and transverse strength —

		Weight	Value of P
Baker in 1829 with Madras wood 3 experiments with bars 6 × 2 × 2	found	65 lbs	744
A Mendis No 8 with Ceylon wood with bars 2 × 1 × 1		55	1 042
A Mendis No 52 with Ceylon wood with bars 2 × 1″ × 1″		57	504
Skinner No 47 with Madras wood		60	870
Puckle (Balfour p 317) with West Mysore wood 3 experiments with bars 2 × 1 × 1″			812
The Catalogue of the Paris Exhibition 1862 Central Provinces wood with bars 3 × 1½″ × 1½		61	620 to 1 009
Wallich No 187 with Ceylon wood		51	
Smythies in 1878 found the average of our specimens to ...		...	

frai ... icture
unc ... d well
bec ... is not
... nd for
cabinet work and the backs of brushes

		lbs
C 1153	Ahiri Central Provinces	54
C 1412	S oni Central Provinces	49
C 2747	Jamui Berar	52
C 1239	Gumsur Madras	56
C 1301		56
D 1069	North Arcot	61
No 20	Salem Collection	61
No 8, No 52	Ceylon Collection	56

11 CEDRELA, Linn

Besides the two species Kurz gives *C multijuga* Kurz i 228 Vern *Toung da ma*, as a large rather rare evergreen tree of Pegu

Wood light, soft, red , no heartwood Annual rings marked by a continuous belt of larger pores Pores prominent on a vertical section Medullary rays distant

1 C Toona, Roxb , Hook Fl Ind i 568, Roxb Fl Ind i 635, Beddome t 10, Brandis 72 , Kurz i 228, Gamble 16 The Toon Tree

8. SOYMIDA, Adr. Juss.

1. S. febrifuga, Adr. Juss.; Hook. Fl. Ind. i. 567; Beddome t. 8; Brandis 71; Kurz i. 228. *Swietenia febrifuga,* Willd.; Roxb. Fl. Ind. ii. 398. Indian Red Wood. Vern. *Rohan,* Hind.; *Rohina,* Beng.; *Shem, wond,* Tam.; *Sumi,* Tel.; *Sohan,* Uriya; *Soimi,* Gondi; *Royta,* Bhil.

A large deciduous tree. Bark $\frac{1}{3}$ to $\frac{1}{2}$ inch thick, bluish grey or dark brown. Sapwood small, whitish; heartwood extremely hard and close-grained, reddish black, very durable. Pores moderate-sized, scanty. Medullary rays moderately broad, distinctly visible on a radial section as dark, shining, horizontal plates. Numerous fine, concentric lines of lighter colour, often closely packed and forming broader bands.

Central India and Dekkan.

Weight, according to Skinner, No. 117, and Fowke, 66 lbs.; R. Thompson gives 71, and Bombay specimens gave 76; Wallich (*Swietenia febrifuga*) 55 lbs.; our specimens give an average of 73·5 lbs. According to Skinner's experiments, the value of P is 1024, Fowke gives 626. The wood is durable. Skinner says that a piece taken out of the workshop at Fort Saint George, which had been erected in 1803 and pulled down in 1859, stood 1,232 lbs. without breaking a scantling $3' \times 1\frac{1}{2}'' \times 1\frac{1}{2}.''$ It is not much attacked by white ants. It is used for construction, well-work, ploughshares and oil-mills. The bark is bitter, and is used as a febrifuge and in diarrhœa and dysentery.

		lbs.
C 194.	Mandla, Central Provinces, 1871	73
C 1123.	Ahiri Reserve, Central Provinces	72
C 1240.	Gumsúr, Madras	74
D 2113.	Mysore	75

9. CHICKRASSIA, Adr. Juss.

Besides these species, Kurz describes *C. velutina,* Roemer. Vern. *Yimmah,* as occurring in Pegu.

1. C. tabularis, Adr. Juss.; Hook. Fl. Ind. i. 568; Beddome t. 9; Brandis 73; Kurz i. 227. *Swietenia Chickrassa,* Roxb. Fl. Ind. ii. 399. Chittagong Wood. Vern. *Chikrassi,* Beng.; *Boga poma,* Ass.; *Aglay, agal, eleutharay,* Tam.; *Madagari vembu,* Tel.; *Ganti malle,* Salem; *Dalmara,* Kan.; *Pabba,* Mar.; *Main,* Hyderabad; *Saiphra, sey barasi,* Magh; *Chegarasi* Chakma; *Yimmah, yengma,* Burm.; *Arrodah,* And.

A large tree. Bark reddish brown, deeply cracked. Heartwood hard, varying from yellowish brown to reddish brown, with a beautiful satin lustre, seasons and works well; sapwood of a lighter colour. Pores moderate-sized, often oval and subdivided, isolated, uniformly distributed. Medullary rays fine, uniform, mostly equidistant, slightly undulating; the distance between the rays generally equal to the transverse diameter of the pores. Annual rings distinctly marked by a sharp line.

Eastern Bengal, Assam, Chittagong, Burma and South India.

Growth, moderate, 8·6 rings per inch of radius. Weight, according to Skinner, No. 46, 42 lbs.; our specimens give an average of 45·5 lbs. Skinner's experiments give P = 614. The wood is used for furniture and for carving. The bark is a powerful astringent, and the flowers give a red or yellow dye.

		lbs.
E 1260.	Tezpúr, Assam	40
E 2197.	Nowgong, Assam	45
E 1401.	Chittagong	49
W 764.	South Kanara	43
W 1218.	North Kanara	44
B 2516.	Burma (1862)	52

10 CHLOROXYLON, DC

1 C Swietenia, DC , Hook Fl Ind i 569, Beddome t 11, Brandis 74 *Swietenia Chloroxylon*, Roxb Fl Ind ii 400 Satin Wood Vern *Behia, girya, behru, bihri*, C P , *Mududad*, Tam , *Billu, bilgu*, Tel , *Burus, purush*, Tam , *Behru*, Uriya , *Halda, bheria*, Mar , *Huragalu*, Mysore , *Burute, rial burute* Cingh

A moderate sized deciduous tree Bark ⅓ inch thick, soft, spongy, light grey or yellow Wood very hard, yellowish brown, the inner wood of a darker colour, but no distinct heartwood, with a beautiful satiny lustre, seasons well Annual rings distinct Pores very small Medullary rays fine, uniform and equidistant, very numerous, distinctly visible on a radial section as shining irregularly shaped plates, the distance between the rays is greater than the transverse diameter of the pores

Central and South India and Ceylon

Growth slow 16 rings per inch of radius The following experiments have been made to determine the weight and transverse strength —

		Weight	Value of P
Baker in 1829 with Madras wood 3 experiments with bars 6 × 2 × 2	found	65 lbs	744
A Mendis No. 8, with Ceylon wood with bars 2 × 1″ × 1″		55	1 042
A Mendis No 52 with Ceylon wood with bars 2 × 1″ × 1″		57	504
Skinner No 47 with Madras wood		60	870
Puckle (Balfour p 317) with West Mysore wood 3 experiments with bars 2 × 1″ × 1			812
The Catalogue of the Paris Exhibition 1862 Central Provinces wood with bars 3 × 1½ × 1½		61	620 to 1 059
Wallich No 187 with Ceylon wood		51	
Smythies in 1878 found the average of our specimens to give		57	

The wood is used f
frames In Madras i
under water It has ‥
been found suitable it is however good for turning It is *imported into England for* cabinet work and the backs of brushes

		lbs
C 1153	Ahiri Central Provinces	54
C 1412	Seoni Central Provinces	49
C 2742	Jamuri Berar	52
C 1239	Gumsur Madras	56
C 1301		56
D 1060	North Arcot	61
No 20	Salem Collection	61
No 8 / No 52	Ceylon Collection	56

11 CEDRELA, Linn

Besides these two species Kurz gives *C multijuga* Kurz i. 228 Vern *Toung da-ma*, as a large rather rare evergreen tree of Pegu.

Wood light, soft, red, no heartwood Annual rings marked by a continuous belt of larger pores Pores prominent on a vertical section Medullary rays distant

1 C Toona, Roxb , Hook Fl Ind. i 568, Roxb Fl Ind i 635, Beddome t 10, Brandis 72, Kurz i 228, Gamble 16 The Toon Tree.

Vern. *Tún, túni, lím, maha ním*, Hind.; *Túni, tún, lúd*, Beng.; *Maha limbu* Uriya; *Mahlun*, Satpuras; *Drawi*, Pb.; *Túni, bobich, labshi*, Nep.; *Simal* Lepcha; *Poma, henduri poma*, Ass.; *Súli, máli*, Salem; *Kal kilingi*, Nilgiris; *Sandani vembu*, Tinnevelly; *Tundú, kempú gandagheri*, Kan.; *Nogé, belandi*, Coorg; *Deodari, kúruk*, Mar.; *Chikado, tseetkado*, Magh; *Shurúzbed*, Chakma; *Thitkado*, Burm.

A large tree. Bark thin, dark grey or reddish brown, exfoliating when old in irregular woody scales. Wood brick-red, soft, shining, even but open-grained, fragrant, seasons readily, does not split nor warp. Annual rings distinctly marked by a belt of large and numerous pores. Pores frequently double or subdivided, unequally distributed, scanty in the autumn wood, somewhat unequal in size, prominent on a vertical section; those in the spring wood larger. Medullary rays red, fine and moderately broad, uniform; the distance between the rays generally equal to the transverse diameter of the pores.

Sub-Himalayan forests, Bengal, Burma, South India; ascending in the North-West Himalaya to 3,000 feet, in Sikkim to 7,000 feet.

Growth rapid: Brandis says that in 1863 he measured the following trees on the Eastern Jumna Canal near Saharanpur:—

Age 30 years, girth 58 inches, mean of 6 trees.
" 35 " " 86 " " 5 " .

This would give a growth of 2½ to 3 rings per inch of radius, which is very fast. Our specimens shew a growth varying from 3 to 9 rings per inch of radius, shewing that some have come from fast-grown trees, while others have had only a moderate growth.

The weight and transverse strength have been determined by the following experiments:—

Experiment by whom conducted.	Year.	Wood whence procured.	Number of experiments.	Size of bar.	Weight.	Value of P.
				Ft. in. in.		
Clifford	1863	Bengal	...	6 × 2 × 2	34	369
Campbell	1831	Morung	1	6 × 2 × 2	35	.423 (unseasoned).
Kyd	1831	Assam	2	2 × 1 × 1	33	.465
Cunningham	1851	Gwalior	2	2 × 1 × 1	34	541
Skinner, No. 15	1862	Travancore	...	...	31	560
Baker	1829	Chittagong	3	6 × 2 × 2	40	550
Fowke	1859	...	...	......	35	420
Brandis, No. 25	1862	Burma	...	......	28	......
R. Thompson	1868	Central Provinces.	...	......	35	......
Wallich, Nos. 39 and 40	...	Assam & India	2	......	34	......
Hamilton	...	...	...	......	36	......
Smythies	1878	Different provinces.	17	......	35	......

The wood is durable and is not eaten by white ants; it is highly valued and universally used for furniture of all kinds, and is also employed for door panels and carving. From Burma it is exported under the name of 'Moulmein Cedar,' and as such is known in the English market. It there fetches about Rs. 65 per ton, the cost of cutting and delivery being Rs. 44, according to Major Seaton. In North-West India it is used for furniture, carvings and other purposes. In Bengal and Assam it is the chief wood for making tea-boxes, but is getting scarce on account of the heavy demand. The Bhutias use it for shingles and for wood carving, they also hollow it out for rice pounders. It is, or rather used to be, for very large trees are now rather scarce, hollowed out for dug-out canoes in Bengal and Assam. In Bengal, Assam and Burma it grows to a very large size, trees 20 feet girth with a height of 80 to 100 feet of clear stem being not uncommon in forests which have been only little worked like those in Dumsong and in some parts of the Chittagong Hill Tracts. At page 91 of

the Indian Forester Vol i the cubic contents of 4 trees in the Reyang Valley

freely The leaves are used to feed cattle and the flowers yield a red or yellow dye (*Gulnari*) The bark is astringent and gives a resinous gum it is also used as a febrifuge

		lbs
P 1191	Madhopur Punjab	35
H 8	Simla Punjab	37
H 5	Sirmur Punjab	
O 214	Garhwal 1868	36
C 177	Mandla Central Provinces 1871	37
E 360	Tukdah Darjeeling 5 000 ft	34
E 2333	Darjeeling 6 000 ft	34
E 605	Bamunpokri Darjeeling Terai	30
E 2332	Sukna Darjeeling 2 000 ft	36
E 640	Kamrup Assam	44
E 1266	Tezpur Assam	34
E 1229	Sibsagar Assam	31
E 712	Chittagong	
D 1054	Salem Madras	39
W 763	South Kanara	29
B 272	Burma 1867	35
B 803	Tharrawaddi Burma	38
No 18	Salem Collection	35
No 19	(marked *Chickrassia tabularis*)	37

2 **C serrata**, Royle, Brandis 73 Kurz i 229 *C Toona*, Roxb, Hook Fl Ind i 568 (in part) Vern *Drawi, dalli, dal, dauri, khishing, khinam* N W Him

A tree Bark dark grey, ½ inch thick, with regular longitudinal furrows Heartwood light red, even, but open grained, fragrant Annual rings distinctly marked by broad belts of numerous large pores Pores often double or divided into three compartments, unequal in size, and unequally distributed, very prominent on a vertical section, scanty and small in autumn wood, large and very numerous in spring wood Medullary rays fine and moderately broad

North West Himalaya up to 8 000 ft

Growth moderate, 10 rings per inch of radius consequently slower than that of Toon

Average weight 31 lbs per cubic foot Wood used for many purposes about Simla also for the hoops of sieves and for bridges The shoots and leaves are lopped for cattle fodder

		lbs
H 3181	Dungagalli Hazara 6 000 ft	
H 920	Hazara, Punjab 6 000 ft	38
H 897	Murree Punjab 7 000 ft	29
H 782	Salán Chamba 5 000 ft	28
H 25	Matiyana Simla 7 000 ft	31
H 130	Deoban Jaunsar, 5 500 ft	30

B 503 sent from the Andaman Islands under the name of *D* [illegible]
Vern *Thikado* Burm *Pada* And has a reddish moderately [illegible]
which seasons well Pores large scanty often subdivided [illegible]
vertical section Medullary rays numerous fine uniform the
rays many times less than the transverse diameter of the pores
to *Meliaceæ*, but cannot at present be identified

ORDER XXVIII. CHAILLETIACEÆ.

An Order containing one Indian genus, *Chailletia*, with three species: *C. gelonioides*, Hook. f.; Hook. Fl. Ind. i. 570; Beddome lix.; Kurz i. 230 (*Moacurra gelonioides*; Roxb. Fl. Ind. ii. 69.) Vern. *Moakurra*, Beng., is a small tree of Eastern Bengal, South India and Burma; *C. Helferiana*, Kurz; and *C. longipetala*, Turcz (*C. macropetala*, Turcz; Kurz i. 231), are evergreen shrubs of Tenasserim.

ORDER XXIX. OLACINEÆ.

An Order which contains about 19 or 20 genera of Indian trees, shrubs or climbers, including about 40 species. They are chiefly found in the moist zones of Eastern Bengal, Burma and the Western Ghâts. But little is known of the qualities and uses of their wood.

The Order is divided into 4 Tribes, *viz.*:—

Tribe I.—Olaceæ	*Ximenia, Olax, Erythropalum, Strombosia, Anacolosa* and *Schöpfia*.
„ II.—Opilieæ	*Cansjera, Lepionurus* and *Opilia*.
„ III.—Icacineæ	*Gomphandra, Apodytes, Mappia, Daphniphyllopsis* and *Phlebocalymna*.
„ IV.—Phytocreneæ	*Phytocrene, Miquelia, Sarcostigma, Natsiatum* and *Iodes*.

Ximenia americana, Willd.; Hook. Fl. Ind. i. 574; Roxb. Fl. Ind. ii. 252; Kurz i. 232. Vern. *Uranechra*, Tel.; *Pinlaytsee*, Burm., is a straggling shrub of South India, Tenasserim and the Andamans, with a yellow wood said by Roxburgh to be sometimes used as a substitute for Sandal. Of *Erythropalum*, there are 3 species of climbing shrubs: *E. vagum*, Mast.; Hook. Fl. Ind. i. 578, of the Eastern Himalaya; *E. populifolium*, Mast.; Hook. Fl. Ind. i. 578, of Travancore; and *E. scandens*, Bl.; Hook. Fl. Ind. i. 578; Kurz i. 234; Gamble 18, of the North-East Himalaya, Khasia Hills, Eastern Bengal and Burma. *Strombosia* contains 2 large trees: *S. javanica*, Bl.; Hook. Fl. Ind. i. 579; Kurz i. 235, of Tenasserim, and *S. ceylanica*, Gardn.; Beddome t. 137, of the Western Ghâts. *Anacolosa* includes four trees: *A. densiflora*, Beddome t. 138, of the Anamalai Hills; *A. ilicoides*, Mast.; Hook. Fl. Ind. i. 580, of the Khasia Hills; *A. Griffithii*, Mast.; and *A. puberula*, Kurz i. 235, of Tenasserim and the Andamans. *Schöpfia fragrans*, Wall.; Hook. Fl. Ind. i. 581, is a small tree of Nepal and the Khasia Hills; and *S. acuminata*, Wall., of Assam, the Khasia Hills and Sylhet.

Cansjera Rheedii Gmelin; Hook. Fl. Ind. i. 582; Brandis 75; Beddome clxxix.; Kurz i. 237 (under Thymelæaceæ) (*C. scandens*, Roxb. Fl. Ind. i. 441), is a large evergreen climbing shrub of Oudh, Southern India and Burma. *Lepionurus oblongifolius*, Mast.; Hook. Fl. Ind. i. 583; Gamble 18 [*L. sylvestris*, Kurz ii. 330 (under Santalaceæ)] is a small tree of the North-East Himalaya and Eastern Bengal. *Opilia amentacea*, Roxb. Fl. Ind. ii. 87; Hook. Fl. Ind. i. 583; Beddome lx.; Kurz i. 238 Vern. *Baleekoma*, Tel., is a scandent shrub or small tree of South India and Burma.

Of *Gomphandra*, there are two South Indian trees: *G. axillaris*, Wall.; and *G. polymorpha*, Wight; Beddome lxi.: while 3 species, *G. penangiana*, Wall.; *G. affinis*, Mast.; and *G. tomentella*, Mast, all under *Stemonurus* in Kurz i. 339,340, occur in Tenasserim. *Apodytes Benthamiana*, Wight; Beddome t. 140, is a tree of the Western Ghâts; and *A. andamanica*, Kurz i. 239, a tree of the Andaman Islands. *Mappia* contains 4 species from South India, *M. fœtida*, Miers; Beddome t. 141, being common on the Nilgiris. *Phlebocalymna* (*Gonocaryum*, Miq. in Kurz i. 240-241) contains 2 Burmese trees.

Phytocrene gigantea, Wall.; Hook. Fl. Ind. i. 591; Kurz i. 241, is a gigantic climber of the forests of Chittagong and Burma, whose stem on being cut gives out a quantity of fresh water good for drinking; the structure of its wood is very curious. Of *Miquelia*,

there are two climbing shrubs *M Kleinii*, Meissn , of Assam, and *M. dentata*, Beddome, of the Anamalai Hills *Sarcostigma* and *Iodes* contain also climbing shrubs of little interest *Natsiatum herpeticum*, Ham , Hook Fl Ind. i 595, Kurz i 242, Gamble 18 Vern *Sungoo*, Lepcha, is a common climber throughout Eastern Bengal and Burma.

1. OLAX, Linn.

he one described, one is found in Southern , one, *O acuminata*, Wall , in Eastern n, and one, *O nana*, Wall , Brandis 75,

1. O. scandens, Roxb. Fl Ind. i. 163, Hook. Fl. Ind. i. 575; Brandis 75; Kurz i 233 Vern. *Dheniani*, Hind; *Koko-aru*, Beng , *Kurpodur*, *murki malle*, *turla-vepa*, Tel., *Harduli*, *urchirri*, Mar.; *Lailoo*, Burm.

A large rambling shrub, sometimes a climber. Bark grey, ¼ inch thick. Wood porous, yellowish white, soft Pores numerous, large and moderately sized, uniformly distributed, often oval. Medullary rays fine, numerous, not prominent.

Sub Himalayan tract in Kumaun, Behar, Central and South India, Burma Weight, 38 lbs per cubic foot The fruit is used in Hazáribagh for making sherbet.

		lbs
C 1181	Ahiri Reserve, Central Provinces	40
C 2762	Moharli " " "	36

2. DAPHNIPHYLLOPSIS, Kurz.

1. D. capitata, Kurz in Journal As Soc Calc, 1875, p 201, For. Fl. B. Burma i. 240, Gamble 18 *Ilex daphniphylloides*, Kurz; Hook Fl. Ind. i. 606. Vern *Kalay*, *chilauni*, Nep , *Tumbrúng*, Lepcha.

A large tree Wood grey, soft, even-grained Pores small, often in short radial lines between the fine and very numerous straight medullary rays.

Forests of the Sikkim Himalaya above 5,000 feet, and of Martaban between 4,000

		lbs
E 695	Chuttockpur, Darjeeling, 6,000 feet . . .	39

Order XXX. ILICINEÆ.

An Order containing only one Indian genus

1 ILEX, Linn

A genus of 21 Indian species, of which 11 are found in the Eastern Himalaya and Khasia Hills, 3 in the North-West Himalaya, 6 in Burma, and 4 in South India The following list is taken from the Flora Indica, pp 598 to 606 —

1. *I insignis*, Hook f . . . . . . Sikkim, 7,000 feet.
2 *I. dipyrena*, Wall . . . . . Himalaya, Simla to Sikkim.
3. *I odorata*, Ham . . . . . " Simla to Nepal
4 *I. malabarica*, Beddome . . . . . Western G
5. *I Walkeri*, Wight and Arn., Beddome Icon. . "

6. *I. denticulata*, Wall.	Western Ghâts.
7. *I. theæfolia*, Wall.	Sikkim, Khasia, Tenasserim.
8. *I. embelioides*, Hook. f.	Khasia Hills.
9. *I. Griffithii*, Hook. f.	Assam, Sylhet.
10. *I. Thomsoni*, Hook. f.	Eastern Himalaya, Khasia.
11. *I. intricata*, Hook. f.	Eastern Nepal and Sikkim, 10,000 to 11,000 feet.
12. *I. fragilis*, Hook. f.	Eastern Himalaya, Khasia.
13. *I. venulosa*, Hook. f.	Khasia Hills.
14. *I. Gardneriana*, Wight; Beddome lxii.	Nilgiris.
15. *I. Wightiana*, Wall.	"
16. *I. excelsa*, Wall.	Himalaya, Khasia.
17. *I. Godajam*, Colebr.	Eastern Sub-Himalaya, Burma.
18. *I. sulcata*, Wall. (*I. Godajam*, Kurz i. 245, *part*)	Tenasserim.
19. *I. macrophylla*, Wall.; Kurz i. 246	"
20. *I. cymosa*, Bl.; Kurz i. 246	"
21. *I. Wallichii*, Hook. f.; Kurz i. 246	"

I. excelsa, Wall.; Hook. Fl. Ind. i. 603 (*I. exsulca*, Wall.; Brandis 76). Vern. *Túmari*, Hind., is a small evergreen tree of the outer Himalaya and Siwalik tract extending eastwards to Assam and the Khasia Hills. *I. odorata*, Ham.; Brandis 77, is an evergreen tree of the outer Himalaya from the Sutlej to Sikkim, ascending to 6,000 feet. *I. Godajam*, Colebr.; Kurz i. 245; Gamble 18. Vern. *Tirsam*, Ass., is a good-sized tree of the Sub-Himalayan tract from Nepal eastwards. *I. denticulata*, Wall.; Beddome t. 142, with a good timber, which is said not to warp nor crack, is found in the Nilgiris and Anamalai Hills. *I. Wightiana*, Wall. Vern. *Horralu*, Nilgiris, has a pale yellow wood useful for building and for bowls and platters. The European Holly is *I. Aquifolium*, Linn., while the Maté or Paraguay Tea is made from the leaves of *I. paraguayensis*.

Pores small, arranged in radial lines or irregular elongated patches. Medullary rays of two classes, fine and broad, prominent on a vertical section, and generally darker coloured than the fibrous tissue, giving the wood a mottled appearance.

1. I. dipyrena, Wall.; Hook. Fl. Ind. i. 599; Brandis 76; Gamble 18. Vern. *Shangala, kandlar, kalúcho, diúsa, dodru, drúnda*, Pb.; *Kaula, karaput, munasi, gulsima*, Nep.; *Kandara, kadera, kateru*, Simla.

A small evergreen tree. Bark dark, rough. Wood white, hard, close-grained. Pores extremely small, in long irregular wavy radial lines. Medullary rays short, moderately broad to broad, prominent on a radial section, giving the wood a mottled appearance.

Himalaya, from the Indus to Bhutan, above 5,000 feet.
Weight, 46 lbs. per cubic foot.

	lbs.
H 21. Matiyána, Simla, 7,000 feet	46

2. I. theæfolia, Wall.; Hook. Fl. Ind. i. 601. *I. gaultheriæfolia*, Kurz i. 245.

A moderate-sized evergreen tree. Wood white, soft, close-grained, with white concentric lines, which seem to correspond to annual rings. Pores very small and numerous. Medullary rays very fine and broad; the latter short, scanty, prominent, giving the wood on a vertical section a beautifully reticulate appearance.

Darjeeling and Khasia Hills and Tenasserim.
Weight, 39 lbs. per cubic foot.

	lbs.
E 692. Chuttockpur, Darjeeling, 6,000 feet	39

3 I. insignis, Hook. f, Hook Fl Ind i 599, Gamble 18 Vern *Lasuni*, Nep.

A small evergreen tree, with smooth grey bark Wood white, soft, close grained *Pores very small, numerous, often in radial lines* Medullary rays very fine and broad, the latter longer than in *I theæfolia*, prominent on a radial section, giving the wood a mottled appearance

Darjeeling above 6 000 feet

Weight, 40 lbs In winter it has clusters of bright red berries like common holly, and is used for similar purposes of decoration

	lbs
E 305 *Gampahar Forest, Darjeeling 7 000 feet*	40

H 256, *from the Garhwal Hills, is a specimen sent by* Mr R Thompson in 1868 It has been much eaten by insects, but shews a structure similar to that of *I insignis* We refer it to *I odorata*, Ham Weight, 32 lbs per cubic foot

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Order XXXI CELASTRINEÆ

An Order of trees shrubs and climbers, sometimes thorny and recognised by the *flowers having a con* [illegible] which are f und in North West India [illegible] moist zones.

The Order is divid [illegible] 3 These are—

Tribe I —Celastreæ

Sub-Tribe	I —Euonymeæ	*Euonymus Glyptopetalum Microtropis Lophopetalum* and *Pleurostylia*
„	II —Celastreæ	*Celastrus, Gymnosporia* and *Kurrimia*
„	III —Elæodendreæ	*Elæodendron*
Tribe II —Hippocrateæ		*Hippocratea Salacia* and *Siphonodon*

Glyptopetalum contains 3 shrubs or small trees, of which *G zeylanicum*, Thw and *G grandiflorum*, Beddome lxv, are large shrubs of the Western Ghats and *G sclerocarpum* (*Euonymus sclerocarpus*, Kurz i 250), with a white close grained wood, of the Pegu Yoma *Microtropis* contains 7 species of which 1 occur in Southern India, 3 in Burma, and 2 in the Eastern Himalaya and Eastern Bengal The chief species is *M discolor*, Wall, Hook Fl Ind i 614, Kurz i 251, Gamble 18 (*Euonymus garcinifolia* Roxb Fl Ind i 628) Vern *Suglim*, Lepcha *Mri*, Sylhet *Pleurostylia Wightii* W and A, Hook Fl Ind i 617, is a small tree of So[illegible] tree of which *K paniculata*, Wall, Hook [illegible] Beddome t. 120), is a handsome tree of the An[illegible] and *K pulcherrima* Wall (*K robusta*, Kurz i 253) Vern *Kwaydouk*, Burm, an evergreen tree of Burma with a brown, [illegible]

Wood even-grained, not very hard, [illegible] (except *Elæodendron*) Pores uniformly [illegible] small Medullary rays very fine, very [illegible]

1. EUONYMUS, Linn.

A genus of about 24 Indian species, of which many are merely small shrubs or climbers. About 11 occur in the Eastern Himalaya, Assam and Eastern Bengal, 5 in the North-West Himalaya, 5 in Burma and 7 in South India. Among them, *E. crenulatus*, Wall.; Hook. Fl. Ind. i. 608; Beddome t. 141, of the Nilgiris, and *E. glaber*, Roxb. Fl. Ind. i. 628; Hook. Fl. Ind. i. 609; Kurz i. 248, of Chittagong and Burma, may be mentioned as most important. *E. echinatus*, Wall.; Hook. Fl. Ind. i. 611; Brandis 80; Gamble 18, is a small climbing or epiphytic shrub of the Himalaya from the Jhelum to Sikkim at 7,000 to 12,000 feet. The wood of some species may be worth trying as a substitute for boxwood.

Wood compact, even-grained, white. Pores very or extremely small. Medullary rays very fine and very numerous.

The first four species here described are common in the North-West Himalaya, and may thus be distinguished :—

Leaves membranous	Leaves deeply cut	. *E. lacerus.*
	„ slightly cut	. *E. Hamiltonianus.*
Leaves coriaceous	Leaves long, sharply serrate .	. *E. pendulus.*
	„ short, obtusely serrate .	. *E. tingens.*

1. E. lacerus, Ham.; Brandis 78. *E. grandiflorus*, Wall.; Hook. Fl. Ind. i. 608. Vern. *Siki, pattali, papar, banchír, dudhapár, hanchu, pásh, mara, chíkan, rangchúl, kioch*, Punjab; *Gule, grui*, Simla.

A small deciduous tree with smooth grey bark. Wood white, moderately hard, exceedingly compact, close and even-grained. Annual rings visible, but not very distinct. Pores extremely small, barely visible under the lens. Medullary rays extremely fine.

Himalaya, from the Indus to Sikkim, between 6,000 and 11,000 feet.
Weight, 48 lbs. per cubic foot. Wood used for carving. The seeds are strung as beads in Bassahir and used for necklaces.

			lbs.
H	67.	Nagkanda, Simla, 9,000 feet	48
H	2883.	„ „ „	46
H	3011.	„ „ „	49
H	3187.	Dungagalli, Hazara, 8,000 feet	...

2. E. Hamiltonianus, Wall.; Hook. Fl. Ind. i. 612; Brandis 78. *E. atropurpureus*, Roxb. Fl. Ind. i. 627. Vern. *Siki, singi, chual, watal, papar, rithu, ranái, brahmáni, banchor, karún, skioch, sidhera, naga*, Pb.; *Agniun, agnu*, Kumaun.

A large deciduous shrub, or small or occasionally moderate-sized tree. Bark thick, grey, corky, with deep irregular fissures. Wood white, with a slight yellow tinge, soft, close-grained. Annual rings marked by a narrow belt of firm wood with fewer pores.

Outer Himalaya, from the Indus to Bhutan, Khasia Hills, from 4,000 to 8,000 feet.
Weight, 35 lbs. Wood used for carving into spoons.

			lbs.
H	3173.	Dungagalli, Hazara, 8,000 feet	...
H	919.	Hazára, Punjab, 8,000 feet	36
H	172.	Murree, Punjab (1866), 7,000 feet	...
H	778.	Kalatop Forest, Punjab, 7,000 feet	34
H	2897. / H 3012.	Nagkanda, Simla, 9,000 feet	44

3. E. pendulus, Wall.; Hook. Fl. Ind. i. 612; Brandis 79. Vern. *Chopra, pincha, garúr, kúnku*, N.-W. P.

A moderate-sized evergreen tree with grey, rather corky bark, ¼ inch thick Wood white, moderately hard, compact, with a light red tinge, very close and even grained Annual rings marked by an almost continuous line of pores Pores very small, very numerous Medullary rays extremely fine, very numerous

Himalaya from the Jhelum to Nepal between 2 500 and 7 500 feet
Weight 35 to 41 lbs per cubic foot

			lbs
H	86	The Glen Simla, 6 000 feet	35
H	2837		41

4 Brandis 79 Vern
Kungku *nei mahaul*, Simla
A outside and yellow
inner ba l are the same as in *Euonymus lacerus*, except that the wood of this species has a slightly reddish tinge

0 000 feet
from the other 3 species

			lbs
H	32	Madhan Simla 7 000 feet	48
H	2814.	Mahasu Simla 8 000 feet	46
H	2881	Nagkanda Simla 8 000 feet	

5 E theæfolius, Wall , Hook Fl Ind i 612, Gamble 18
A shrub with wood of structure similar to the rest, but the medullary rays are somewhat broader and the annual rings more distinct

E 3308 Rangbul, Darjeeling 7 500 feet

2 LOPHOPETALUM, Wight

hich 6 are Burmese, 1 from
L fimbriatum Wight is a
imalaya, Syll et and Tenas

Wood light, soft to moderately hard, even grained, somewhat shining Pores small to moderate sized Medullary rays very fine, very numerous, traversed by concentric bands of softer texture

1 L littorale, Kurz i 255 *Kokoona littoralis*, Lawson, Hook. Fl Ind i 617 Vern *Moondein*, Burm

A tree Wood *grey, moderately hard*, even grained Pores small and moderate sized, often oval and subdivided Medullary rays very fine, uniform and equidistant, very numerous, the distance between the rays much less than the transverse diameter of the pores Medullary rays traversed by numerous parallel, concentric, wavy lines, which have the appearance of interrupting the rays, thus forming a succession of wavy, concentric bands

Pegu and Tenasserim
Weight on an average 35 lbs per cubic foot

			lbs
B	278	Burma (1867)	27
B	2513	(1862)	36
B	2300	Andaman Islands (1866)	41

2. L. Wightianum, Arn.; Hook. Fl. Ind. i. 615,; Beddome t. 145. Vern. *Bolpalé,* Kan.

A large evergreen tree. Wood reddish grey, moderately hard, close-grained, structure similar to that of *L. littorale.* Pores somewhat larger, and less numerous. Medullary rays prominent on a radial section.

Western coast from the Konkan to Cape Comorin.

Weight, 28 to 29 lbs. per cubic foot. The wood is much esteemed in South Kanara where it is used for house-building.

		lbs.
W 723.	South Kanara	29
W 853.	" "	28

3. L. Wallichii, Kurz i. 255; Hook. Fl. Ind. i. 615. Vern. *Mong-taing, moondein,* Burm.

To this species we refer B 1947 (31 lbs.) sent from Tavoy under the name *Kanazo-ta-loo,* Burm., and B 2248 sent in 1866 from the Andamans under the name of *Toung-hmayo.* The structure is similar to that of *L. littorale,* but the pores are more scanty, moderate-sized and arranged in short radial lines. Medullary rays less numerous, slightly broader, and not of uniform width.

The wood is moderately hard; it is recommended by Kurz for furniture. It is said by Major Ford to be used in the Andamans for writing-boards, and the bark, root and fruit as a febrifuge.

3. CELASTRUS, Linn.

This genus includes 2 of the genera of the Flora Indica, *Celastrus* and *Gymnosporia;* of the former 4, of the latter 15, species are described. The 4 species of the section *Celastrus* contain, besides *C. paniculatus,* common to most parts of India, 3 scandent shrubs of Sikkim, Assam and Eastern Bengal. The species of the section *Gymnosporia* are chiefly erect shrubs, often thorny, chiefly of the Eastern Himalaya and the Western Ghâts. The only species of interest are those here described.

Wood close-and even-grained. Pores small or very small. Medullary rays very fine and very numerous. Most species have concentric bands of soft tissue. This does not include *C. paniculatus,* which has the structure of a climber.

1. C. paniculatus, Willd.; Hook. Fl. Ind. i. 617; Roxb. Fl. Ind. i. 621; Brandis 82; Gamble 18. Vern. *Mál kakni,* Oudh, Kumaun; *Kahundan, rangul, wahrangur,* C. P.; *Kanguni,* Bombay; *Ruglim,* Lepcha.

A scandent shrub, with yellow, corky bark. Wood pinkish yellow, soft. Annual rings distinctly marked by very large pores in the spring wood, which diminish in size, and are small in the autumn wood. Medullary rays very broad.

Outer Himalaya from the Jhelum to Assam ascending to 4,000 feet, Eastern Bengal, Behar, South India and Burma.

The seeds give an oil, which is used medicinally, as are also the leaves.

		lbs.
E 2334.	Tukdah, Darjeeling, 5,000 feet	51

2. C. spinosus, Royle; Brandis 80. *Gymnosporia Royleana,* Wall.; Hook. Fl. Ind. i. 620. Vern. *Dzaral,* Trans-Indus; *Kandu, kandiári, pataki, lei, phúlpari, badlo, kadewar,* Pb.; *Kúra, bagriwála darim, gwála darim,* N.-W. P.

A thorny shrub, with thin, grey, corky bark. Wood lemon-coloured, hard and close-grained, with numerous white, concentric bands. Pores very small. Medullary rays very fine, very numerous. It cuts like boxwood, for which it may become a substitute.

Outer North-West Himalaya

Weight, 49 lbs The wood deserves attention as possibly suitable for carving and engraving

			lbs
P 913	Salt Range, Punjab	.	49
P 2932	Sum, Simla, 3,000 feet	. .	49

3. C. senegalensis, Lam., Beddome lxvi., Brandis 81; Kurz i. 252. *C montana,* Roxb Fl. Ind. i. 620 *Gymnosporia montana,* Lawson; Hook. Fl. Ind. i 621 Vern *Sherawane,* Trans-Indus, *Talkar, dajkar, mareila, kingaro, kharái,* Pb, *Baikal, gajachinni,* C. P.; *Mál kangoni,* Bombay, *Danta, babur,* Gondi, *Dhatti,* Bhil, *Bharatti, yekal,* Mar.; *Danti, dantáusi, pedda chintú,* Tel.

A tall spinescent shrub. Bark $\frac{1}{6}$ inch thick, grey, with longitudinal cracks, exfoliating in small scales. Wood pinkish white, soft but close-grained; no heartwood, no annual rings. Pores small, numerous, uniformly distributed. Medullary rays very fine, very numerous. Faint concentric bands.

Northern dry and intermediate zones North-West India, ascending to 4,000 feet,

. .. ·d The leaves are used

			lbs
C 1162	Ahiri Reserve, Central Provinces	. .	
C 2752	Mohârli „ „ „	.	46

4. ELÆODENDRON, Jacq fil.

1. E. Roxburghii, W. and A.; Beddome t. 148, Brandis 82, Gamble 19 *E glaucum,* Pers., Hook. Fl. Ind. i 623; Roxb. Fl. Ind i. 638. *Neerija dichotoma,* Roxb. Fl. Ind. i 616. Vern. *Mirandu, padriún, bakra, janwa,* Pb.; *Bakra, shauria, chauli, daberi, mámri,* N.-W. P; *Chauri, methúr,* Oudh; *Chikyeng,* Lepcha; *Jamrási, kala mukha, rohi,* C. P., *Dhakka, misur,* Gondi, *Niru,* Kurku; *Aran, tamruj,* Mar., *Bala*

[illegible]

sided very small scales. Wood moderately hard, even- and close-grained, works and polishes well, light brown, often with a red tinge; the outer wood white, but no distinct sapwood; no annual rings. Numerous, wavy, concentric, lighter-coloured bands. Pores small, numerous. Medullary rays fine, very numerous, visible on a radial section.

Sub-Himalayan tract from the Ravi eastwards, Central and South India.

Weight, 10 to 50 lbs. (Brandis), 46 (Skinner and Fowke), 53 (R Thompson), 40 (C P. List), our specimens give an average of 53 lbs. Skinner, No 65, gives P = [illegible], Fowke P = 511

[illegible] -, combs

[illegible] bark

A thorny shrub, with thin, grey, corky bark Wood lemon coloured, hard and close grained, with numerous white, concentric bands Pores very small Medullary rays very fine, very numerous It cuts like boxwood, for which it may become a substitute

Outer North West Himalaya
Weight 49 lbs The wood deserves attention as possibly suitable for carving and engraving

			lbs
P	913	Salt Range Punjab	49
P	2932	Suni Simla 3 000 feet	49

3 C senegalensis, Lam , Beddome lxvi , Brandis 81, Kurz i 252 *C montana*, Roxb Fl Ind i 620 *Gymnosporia montana*, Lawson, Hook Fl Ind i 621 Vern *Sherawane*, Trans-Indus, *Talkar, dajkar, mareila, kingaro, Tharai*, Pb , *Baikal, gajachinni*, C P , *Mal kangoni*, Bombay, *Danta, babur*, Gondi, *Dhatti*, Bhil, *Bharatti, yekal*, Mar , *Danti, dantausi, pedda chintu*, Tel

A tall spinescent shrub Bark $\frac{1}{6}$ inch thick, grey, with longitudinal cracks, exfoliating in small scales Wood pinkish white, soft but close grained, no heartwood, no annual rings Pores small, numerous, uniformly distributed Medullary rays very fine, very numerous Faint concentric bands

North West India ascending to 4 000 feet
insula
urable but not used The leaves are used for fodder and the branches as ... the roofs of houses

			lbs
C	1162	Ahiri Reserve Central Provinces	
C	2752	Moharli ,	46

4 ELÆODENDRON, Jacq fil

1 E Roxburghii, W and A , Beddome t 148, Brandis 82, Gamble 19 *E glaucum*, Pers , Hook Fl Ind i 623, Roxb Fl Ind i 638 *Neerija dichotoma*, Roxb Fl Ind i 646 Vern *Mirandu, padriun, bakra, janwa*, Pb , *Bakra, shauria, chauli, daberi, mamri*, N W P , *Chauri, metkur*, Oudh , *Chikyeng*, Lepcha, *Jamrasi, kala mukha, rohi*, C P , *Dhakka, nisur*, Gondi, *Niru*, Kurku, *Aran, tamruj*, Mar , *Bata karas*, Bhil, *Karkaia, irkuli, selupa siri*, Tam , *Nirija, neradi, botanskam*, ...
Cingh
, exfoliating in 4
and close grained,
works and polishes well, light brown, often with a red tinge, the outer wood
... ierous, wavy,
concei
Medullary
rays fi

			lbs.
O	235.	Garhwal (1868)	56
O	2091.	„ (1874)	48
C	183.	Mandla, Central Provinces (1870)	50
C	1182.	Ahiri Reserve, Central Provinces	55
C	2781.	Melghát, Berar	49
E	2335.	Bamunpokri, Darjeeling Terai	57
No.	63.	Ceylon Collection	56

ORDER XXXII. RHAMNEÆ.

Contains twelve Indian genera, of which six are climbing or straggling shrubs and the remainder shrubs or small trees. The Order is subdivided into four Tribes:—

Tribe	I.—Ventilagineæ	*Ventilago* and *Smythea*.
„	II.—Zizypheæ	*Zizyphus* and *Berchemia*.
„	III.—Rhamneæ	*Rhamnus*, *Hovenia*, *Scutia*, *Sageretia*, and *Colubrina*.
„	IV.—Gouanieæ	*Apteron*, *Gouania*, and *Helinus*.

Of the genera not here described, *Smythea* and *Apteron* are scandent shrubs of Tenasserim. *Hovenia dulcis*, Thunb.; Hook. Fl. Ind. i. 640; Roxb. Fl. Ind. i. 630; Brandis 94. Vern. *Chamhún*, Punjab, is a tree commonly cultivated throughout the Himalaya, with a light-coloured, coarse and open-grained wood, and an edible fruit with a flavour like that of the Bergamot Pear. *Scutia indica*, Brongn.; Hook. Fl. Ind. i. 640; Kurz i. 268, is a straggling shrub of Burma and South India. *Colubrina* contains three species, of which *Colubrina asiatica*, Brongn.; Hook. Fl. Ind. i. 642; Beddome lxix.; Kurz i. 268. (*Ceanothus asiaticus*, Roxb. Fl. Ind. i. 615.) Vern. *Kway-nway*, Burm., is a large shrub of the coast forests of Burma and Malabar. *Gouania* contains three climbing shrubs, commonest among which is *G. leptostachya*, DC.; Hook. Fl. Ind. i. 643; Kurz i. 269; Gamble 19. Vern. *Kalalag*, Kumaun; *Batwasi*, Nep.; *Khauta*, Orissa; *T*[illegible], Burm., a large climber of the Eastern Himalaya, Burma and South [illegible] *lanceolatus*, Brandis 574, is a slender twining shrub of the outer North-West Himalaya, ascending to 4,000 feet.

Wood hard or moderately hard. Pores small or moderate-sized. Medullary rays fine or very fine, numerous, equidistant.

1. ZIZYPHUS, Juss.

A genus containing 13 Indian species, 7 of which come from Northern and Central India, about 6 from South India, 4 from Burma, and 6 from the North-East Himalaya and Assam. Six species are here described. Of the remainder, the chief is *Z. vulgaris*, Lamk.; Hook. Fl. Ind. i. 633; Roxb. Fl. Ind. i. 609; Brandis 85. Vern. *Sinjli*, *simli*, *ban*, *ber*, *kandika*, *kandiári*, Hind., a small tree of the arid and northern dry zones. It is found in the outer Himalaya from the Indus to the Ravi, ascending to 6,500 feet, cultivated in the Punjab, Beluchistan, and Bengal, and semi-wild as far as Italy and the south of France—*Mathieu Fl. For.* p. 60. Its fruit is eaten.

Wood reddish, moderately hard or hard; no heartwood. Pores small to moderate-sized, often subdivided, between numerous fine or very fine medullary rays, the distance between the rays being less than the diameter of the pores.

1. Z. Jujuba, Lam.; Hook. Fl. Ind. i. 632; Roxb. Fl. Ind. i. 608; Beddome t. 149; Brandis 86; Kurz i. 266; Gamble 19. Vern. *Bér*, *baer*, *beri*, Hind.; *Kúl*, *bér*, Beng.; *Zeeben*, Burm.; *Rengha*, *regi*, Tel.; *Yellande*, Tam.; *Bhor*, Mar.; *Renga*, Bhíl; *Elentha*, Mal.; *Yelchi*, Kan.

A moderate-sized deciduous tree, almost evergreen. Bark ⅓ inch thick, dark grey, nearly black, with long, deep, irregular cracks. Wood hard, reddish; no heartwood, no annual rings Pores small or moderate-sized, scanty, often oval and subdivided. Medullary rays fine and very numerous, uniform and equidistant; the distance between two rays much less than the transverse diameter of the pores Pores frequently joined by very fine, wavy, interrupted, concentric lines

[illegible]

purposes. The fruit is commonly eaten and is much improved by cultivation.

			lbs
O	265	Garhwal (1868)	
C	2815	Melghát, Berar	
C	1128	Ahiri Reserve, Central Provinces	43
D	1071	North Arcot, Madras	52

P 885, from Multán, sent under the name of *Z flexuosa*, has the same structure as *Z Jujuba*, but the pores are round and moderate sized Weight, 48 lbs

2. Z. nummularia, W. and A.; Hook Fl Ind. i. 633, Beddome lxix.; Brandis 88 *Z microphylla*, Roxb. Fl. Ind. i, 613. Vern. *Karkanna*, Afgh., *Malla, bér, birár, jhari, kanta*, N.-W. P.; *Gangr, jangra*, Sind; *Parpalli gidda*, Kan.

A thorny shrub with grey bark. Wood yellow, hard, compact. Structure similar to that of *Z. Jujuba*, except that the pores are larger and the medullary rays are somewhat further apart; the distance between the rays is less than the transverse diameter of the pores

Drier parts of North-West India and the Dekkan

Growth No P 2931 shews well marked annual rings and a fast growth of 2 to 3 rings per inch of radius Weight, 43 lbs per cubic foot on an average It is used to make fences round fields and gardens The leaves are threshed out and used as fodder for sheep and goats The fruit is eaten

			lbs
P	2931	Bhajji, Simla, 3,000 feet	41
P	3077, 3093	Sabathu, Punjab, 3,000 feet	42
P	412	Ajmere	46

3. Z. oxyphylla, Edgw.; Hook. Fl. Ind. i. 634; Brandis 86. Vern. *Kúrkun bér*, Afgh.; *Pitni, Kokan ber, amlái, amnia, beri, shamor*, Pb.; *Giggar*, N.-W. P.

A thorny shrub with thin brown bark. Wood white, moderately hard. Pores small, somewhat larger and more numerous on the inner edge of each annual ring. Medullary rays equidistant, very fine; the distance between the rays equal to the diameter of the pores.

Outer Himalaya from the Indus to the Ganges from 2,000 to 6,000 feet

H 2947. Suni, Sutlej Valley, 3,000 feet

4. Z. Œnoplia, Mill.; Hook. Fl. Ind. i 634; Beddome lxix.; Brandis 86; Kurz i. 266. *Z Napeca*, Roxb. Fl. Ind. i. 612. Vern. *Makai*, Hind; *Shyakúl*, Beng.; *Barokoli*, Uriya, *Irún*, C. P.; *Paranu*, [illegible] Tel.; [illegible] Burm.

[illegible] with rough, dark-grey bark. Wood [illegible]umber. Concentric bands consisting

of a great mass of moderate-sized to large pores, often subdivided, between closely packed medullary rays, which bend outwards where they touch the pores, presenting a reticulate appearance.

Bengal, Burma, Central and Southern India.

Used for hedges. The fruit is eaten.

C 2753. Moharli Reserve, Central Provinces.

5. **Z. xylopyra,** Willd.; Hook. Fl. Ind. i. 634; Roxb. Fl. Ind. i. 611; Beddome lxviii.; Brandis 90. Vern. *Kat-ber, béri, goti, gotaha, kakor, chittania, sitabér, ghónt,* Hind.; *Goti,* Tel.; *Goti, bhorgoti,* Mar.; *Challe,* Kan.

A large scrambling shrub. Bark grey or reddish brown. Wood yellowish brown, hard. Pores small and moderate-sized, in patches of soft tissue which are often confluent, forming oblique bands. Medullary rays fine, equidistant, very numerous, the distance between the rays being less than the transverse diameter of the pores.

Sub-Himalayan tract from the Ganges to Nepal, Central and Southern India.

Weight, 60 lbs. per cubic foot (Skinner, No. 136); our specimen gives 49 lbs. Skinner gives P = 800. Used for carts and agricultural implements. The bark is used for tanning; the shoots and leaves for fodder. The fruit is not edible, but is used to give a black dye to leather.

		lbs.
C 2736.	Moharli Reserve, Central Provinces	49
C 2764.	Melghát, Berar	...

6. **Z. rugosa,** Lam.; Hook. Fl. Ind. i. 636; Beddome lxvii.; Brandis 89; Kurz i. 265; Gamble 19. *Z. latifolia,* Roxb. Fl. Ind. i. 607. Vern. *Dhaura, dhauri,* Oudh; *Suran, churna,* C. P.; *Suran,* Mar.; *Rukh baer, harray baer,* Nep.

A large scrambling shrub or small evergreen tree, with rough, dark bark. Wood reddish, moderately hard, warps. Pores large and moderate-sized, oval and subdivided. Medullary rays fine, extremely numerous, uniform and equidistant, the distance between the rays much less than the transverse diameter of the pores. Pores frequently joined by very faint, wavy, concentric lines.

Sub-Himalayan tract from the Ganges eastwards, Burma, Central and Southern India.

Weight, 45 lbs. per cubic foot. Wood only used as fuel; often attacked by insects. Fruit eaten.

		lbs.
E 2336.	Bamunpokri, Darjeeling Terai	45

2. BERCHEMIA, Neck.

A genus which besides this species contains several erect or climbing shrubs, of which the chief is *B. lineata,* DC.; Hook. Fl. Ind. i. 638; Brandis 91, of the North-West Himalaya.

1. **B. floribunda,** Brongn.; Hook. Fl. Ind. i. 637; Brandis 91; Kurz i. 264; Gamble 19. Vern. *Kala lag,* Kumaun; *Chiaduk,* Nep.; *Rungyeong rik,* Lepcha.

A large erect or climbing shrub or small tree. Bark whitish, exfoliating and shewing a purple inner layer. Wood yellow, turning grey on exposure, porous. Pores large, oval, subdivided, between undulating moderately broad medullary rays.

Himalaya from the Jhelum to Bhutan, Khasia Hills.

E 2864. Tukdah, Darjeeling, 5,000 feet.

3 VENTILAGO, Gaertn.

Contains 5 species of scandent shrubs Besides the one described, 2 species

1. V. maderaspatana, Gaertn , Hook Fl Ind i. 631, Beddome lxvii , Brandis 96, Kurz i 262 Vern *Raktapita*, Beng , *Yerra chicatli*, Tel , *Papli*, Tam , Kan , *Lokandi*, *Lanwail*, Bombay , *Chorgu*, Hyderabad

A large climbing shrub Bark dark grey with vertical cracks, exposing the inner-surface which has a vermillion colour. Wood greyish yellow, porous, soft, structure similar to that of *Berchemia floribunda*.

Central and Southern India and Burma

The bark is made into cordage, and a red dye is extracted from the root. It is said also to give a gum

C 2920 Central Provinces

4 RHAMNUS.

Contains 7 ... mountains of the Western coast ... Hook Fl Ind i 638, Brandis ... ar, nikki kinder, jalidar, Luchn ... t Ranges and the Himalaya from the Jhelum to Garhwal, *R nepalensis* Wall , Hook Fl Ind i 640 Gamble 19 Vern *Achal*, Nep , is a large shrub of the Central and Eastern Himalaya and Khasia Hills, while *R Wightii*, W and A , is a large shrub of the higher hills of the Western Ghâts

Wood generally with a brown heartwood, close grained Pores very small, arranged in oblique tails and bands which generally anastomose Medullary rays fine, numerous.

1. R. virgatus, Roxb Fl Ind i 604; Brandis 92, Gamble 19 *R dahuricus*, Pall , Hook. Fl. Ind i 639 *R. hirsutus*, W. and A , Beddome lxx Vern *Phipai*, *dádúr*, *tadru*, *seta pajja*, *kánji*, *mamral*, *shomfol*, *reteon*, *gogsa*, *sindrol*, *múlni*, *nior*, *chatr*, *romúsk*, Pb., *Thalot*, *chetain*, Simla , *Tsápo*, *mail*, Tibet, Spiti , *Chato*, *chedwala*, *chadua*, Hind

A shrub or small tree, deciduous Bark thin, grey, smooth Sapwood whitish , heartwood brown, very hard and close-grained Annual rings distinctly marked. Pores very small, arranged in oblique anastomosing irregular bands of soft texture, forming an irregular net-work. Medullary rays fine, very numerous, prominent in the meshes of the net-work. The structure of the wood is the same as that of *Rhamnus catharticus*, Linn.

... t as firewood The fruit is ... the spleen

				lbs
H 70	Mashobra, Simla,	7 000 feet	. . . . .	57
H 2877	Naghanda Simla,	8 000 ,,	. . . . . .	63
H 3168	Dungagalli, Hazara,	7,000 ,,	. . . .	—

2. R. purpureus, Edgew.; Hook. Fl. Ind. i. 639; Brandis 91. Vern. *Bat sinjal, tunani zanani, tadra, tundhi, mimarari, kunji, chaterni*, Pb.

A large deciduous shrub, with thin smooth bark. Wood brownish grey, close-grained. Annual rings marked by an interrupted belt of pores. Pores very small, in narrow irregular radial belts of softer tissue, which often anastomose and have a reticulate appearance. Medullary rays fine, numerous, straight, prominent.

North-west Himalaya from the Indus to Nepal, between 4,500 and 10,000 feet. Weight, 41 lbs. Fruit used as a purgative.

			lbs.
H 70.	Mashobra, Simla, 7,000 feet	. . . .	41
H 2848.	Mahasu, Simla, 8,000 „	. . . .	...

3. R. triquetrus, Wall.; *Hook. Fl. Ind.* i. 639; Brandis 92. Vern. *Gudlei*, Simla; *Fagora, gardhan, phulla*, Pb.; *Gogsa, ghant*, N.-W. P.

A shrub or small tree, deciduous, with thin grey bark. Wood yellowish white, moderately hard, close-grained. Annual rings distinctly marked by an interrupted belt of larger pores. Pores very small to small, arranged in irregular branching bands of softer tissue, which form fantastic patterns. Medullary rays fine and moderately broad, short.

North-West Himalaya from the Jhelum to Nepal, between 3,000 and 6,000 feet.

H 75. Mashobra, Simla, 7,000 feet.
H 2903. Nagkanda, Simla, 8,000 „

4. R. procumbens, Edgew.; Hook. Fl. Ind. i. 640; Brandis 93.

A small procumbent shrub. Wood yellowish, with the same structure as that of *R. virgatus*.

Western Himalaya from Simla to Kumaun, between 7,000 and 8,000 feet.

H 2952. Naldehra, Simla, 7,000 feet.

5. SAGERETIA, Brongniart.

Besides the two species described, *S. oppositifolia*, Brongn.; Hook. Fl. Ind. i. 641; Brandis 95. Vern. *Kanak, gidurdák, drange, girthan*, Pb.; *Aglaia*, Kumaun, is a large shrub of the N.-W. Himalaya.

Wood close-grained, hard. Pores small, round. Medullary rays fine and very fine.

1. S. theezans, Brongn.; Hook. Fl. Ind. i. 641; Brandis 95. Vern. *Dargola*, Simla; *Drangu, ankol, kauli, karúr, phomphli, kánda, brinkol, chaunsh, katráin, thúm, kúm*, Pb.

A large spinescent shrub. Bark thin, grey. Wood very hard, white, with irregular dark-coloured heartwood. Annual rings (?) marked by white lines. Pores round, small, in rings of softer texture, uniformly distributed. Medullary rays fine and very fine, numerous.

Salt Range and Suliman Range. Western Himalaya from Kashmir to Simla, from 3,000 to 8,000 feet. Fruit eaten.

				lbs.
H 2946.	Suni, Sutlej Valley,	3,500 feet	. . . .	...
H 2951.	Naldehra, Simla,	7,000 „	. . . .	...
H 3129.	Koti, Simla,	6,000 „	. . . .	56

2. S. Brandrethiana, Aitch.; Hook. Fl. Ind. i. 642; Brandis 95. Vern. *Ganger, goher*, Pb.; *Maimúna*, Afg.

A small deciduous shrub. Bark grey, with long wrinkles Wood yellow, very hard, close-grained Annual rings distinctly marked by white lines and by an interrupted belt of pores. Pores small, round, numerous, between the white, fine, short, very numerous medullary rays, the distance between the rays equal to the transverse diameter of the pores.

Suliman Range and Salt Range, and North West Himalaya between the Indus and the Jhelum

The fruit is sweet and much eaten by Afghans and in the frontier districts

P 914. Salt Range, Punjab

Order XXXIII. AMPELIDEÆ.

The Vines
large size, and
found in most pa
extensively over
often filled with
repanda, W and A, and *V latifolia*, Roxb, are the chief species of the forests

fencing and
Himalaya,
is a small
llullary rays
of two kinds, very broad and fine

Order XXXIV. SAPINDACEÆ.

Contains about 20 genera of Indian trees or shrubs Most of these come from Burma or Southern India, but the largest genus *Acer*, the Maple, is almost exclusively found in the Himalaya

The Order is divided into 4 Tribes, viz —

Tribe I —Sapindeæ . .	*Hemigyrosa, Dittelasma, Erioglossum, Allophyllus, Æsculus, Scyphopetalum, Cupania, Lepisanthes, Schleichera, Sapindus, Xerospermum, Nephelium, Pometia, Harpullia, Zollingeria*
„ II —Acerineæ .	*Acer* and *Dobinæa*
„ III —Dodonæeæ	*Dodonæa*
„ IV —Staphyleæ .	*Staphylea* and *Turpinia*

Fl I
n 21
Kurz
Brun.,

Anamalai Hills. *Dittelasma Rarak,* Hook. f.; Hook. Fl. Ind. i. 672; Kurz i. 297, is an evergreen tree of the Pegu Yomas and Tenasserim. *Erioglossum edule,* Blume; Hook. Fl. Ind. i. 672 (*E. rubiginosum,* Bl.; Brandis 108. *Sapindus rubiginosa,* Bl.; Beddome lxxiii.; Roxb. Fl. Ind. ii. 282. *Pancovia rubiginosa,* Baill.; Kurz i. 296) Vern. *Ritha,* Hind.; *Ishi rashi,* Tel.; *Manipangam,* Tam.; *Tseikchay,* Burm. (No. 23 Brandis' Burma List, 1862, marked *Sapindus,* 66 lbs. ex Kurz' MSS.), is a large tree of Sikkim, Assam, South India and Burma, said by Roxburgh to have a strong durable wood with a chocolate-coloured heartwood. *Scyphopetalum ramiflorum,* Hiern.; Hook. Fl. Ind. i. 676, and *Zollingeria macrocarpa,* Kurz i. 288. Vern. *Wetkyotbeng,* Burm., are trees of Burma. *Cupania* contains 9 species, the chief of which are *C. glabrata,* Kurz i. 284; Hook. Fl. Ind. i. 676 (*Sapindus squamosus,* Roxb. Fl. Ind. ii. 282) of Burma and *C. pentapetala,* W. and A.; Hook. Fl. Ind. i. 678. (*Schleichera pentapetala,* Roxb. Fl. Ind. ii. 275) Vern. *Koiki-púra* ♂; *Púrakoi* ♀. Sylhet, a large tree of Sylhet; the rest are small Burmese trees. Of *Lepisanthes* there are two Burmese species; *Xerospermum Noronhianum,* Bl.; Hook. Fl. Ind. i. 686; Kurz i. 295, is a tree of the Khasia Hills, E. Bengal and Burma, while *Harpullia cupanioides,* Roxb.; Hook. Fl. Ind. i. 692 (*H. imbricata,* Bl.; Beddome t. 158), is a large tree of the Western Gháts. *Dobinæa vulgaris,* Ham.; Hook. Fl. Ind. i. 696; Gamble 23. Vern. *Samli,* Nep., is a large shrub of the Eastern Himalaya.

Wood generally soft or moderately soft, even grained; no distinct heartwood except in *Schleichera*. Pores small, or very small, generally uniform and uniformly distributed. Medullary rays very fine or fine rarely moderately broad, often closely packed. Apart from the annual rings, no concentric bands except in *Allophyllus* and *Sapindus.*

1. ALLOPHYLLUS, Linn.

A genus containing 2 large shrubs: that here described, which has trifoliolate leaves, and *A. zeylanicus,* Linn.; Hook. Fl. Ind. i. 673; Gamble 22, a shrub or small tree of the Eastern Himálaya and Assam, with unifoliolate leaves.

1. A Cobbe, Bl.; Hook. Fl. Ind. i. 673; Kurz i. 299. *Ornitrophe Cobbe,* Willd.; Roxb. Fl. Ind. ii. 268. *Schmidelia Cobbe,* Beddome lxxiii. Vern. *Thaukjot,* Burm.

A deciduous shrub. Wood grey, soft. Pores small, scanty, medullary rays moderately broad, short, joined by numerous white parallel and equidistant concentric lines; prominent on a radial section.

Eastern Bengal, South India, Burma and Andaman Islands.

		lbs.
B 1988.	Andaman Islands (Kurz 1866)	40

2. ÆSCULUS, Linn.

A genus containing two Indian species. The Horse-chestnut, commonly planted in Europe, is the *Æ. Hippocastanum,* Linn.

Wood white, soft to moderately hard. Annual rings distinct. Pores numerous, small or very small, generally abundant in the spring wood. Medullary rays uniform, equidistant, very fine, very numerous.

1. Æ. indica, Colebr.; Hook. Fl. Ind. i. 675; Brandis 103. The Indian Horse-chestnut. Vern. *Torjaga,* Trans-Indus; *Háne, hanúdún,* Kashmir; *Bankhor, gugu, kanor, pánkar,* Hind.

A large deciduous tree. Bark grey, with long horizontal cracks, exfoliating in long flakes. Wood white, with a pinkish tinge, soft, close-grained. Annual rings marked by a line and sometimes by fewer

pores in the autumn wood Pores very small Medullary rays very fine, very numerous

		lbs
H 31	Matiyána Simla 7 000 feet	31
H 166	Kangra Punjab (1866)	..
H 936	Hazara Punjab	35
H 776	Kalatop Punjab 7 000 feet	34

2 **Æ punduana** Wall , Hook Fl Ind i 675, Gamble 22 *Æ assamica*, Griff , Kurz i 286 Vern *Cherinangri*, Nep , *Kunkirkola, ekuhea*, As , *Dingri*, Dúars , *Bolnawak*, Garo

A moderate sized, deciduous tree Wood white soft, close grained Pores small, in short radial lines between the very fine closely packed, medullary rays Annual rings marked by a faint white line

Northern Bengal Khasia Hills Assam and Burma ascending to 4 000 feet

Growth moderate 10 rings per inch of radius Weight 36 lbs per cubic foot Wood rarely used

		lbs
E 3139	Buxa Reserve Western Duars	36

3 SCHLEICHERA, Willd

1 **S trijuga**, Willd , Hook Fl Ind i 681, Roxb Fl Ind ii 277, Beddome t 119, Brandis 105, Kurz i 289 Vern *Kosum, gausam* Hind , *Rusam*, Uriya , *Pusku, may, roatanga*, Tel , *Pava, pú, pulachi, zolim buriki*, Tam , *Sagdi, sagade, chakota, akota*, Kan , *Chendala*, Coorg, *Puvatti*, Kaders, *Kassumar, koham, kocham*, Panch Mehals , *Kusumb, peduman*, Mar , *Komur, pusku*, Gondi , *Baru*, Kurku , *Gyoben*, Burm , *Cong, conghas*, Cingh

A large deciduous tree Bark ⅓ inch thick, grey, exfoliating in small rounded plates of irregular shape and size Wood very hard Sapwood whitish, heartwood light, reddish brown Pores scanty, moderate-sized, often oval and subdivided White, wavy, concentric lines, which may possibly indicate the annual rings Medullary rays very fine, very numerous, wavy uniform and equidistant, closely packed, the distance between the rays less than the transverse diameter of the pores

Sub-Himalayan tract from the Sutlej eastwards Central and South India and Burma

The weight and transverse strength have been determined by the following experiments —

		Weight	Value of P
Brandis 1862 No 22 Burma	found	70 lbs	
1861 8 experiments with bars 3 × 1" × 1"		68 „	1160
Baker 4 experiments 1829 7 × 2" × 2"	„	68 „	618
Wallich No 170 (*Scytalia trijuga*)	„	60	
Smythies 1878 with our 8 specimens		67 5	...
A Mendis Ceylon Collection No 47	„	57 „	...

The wood is very strong and durable it is used for oil rice and

for agricultural implements and carts. The lac produced on this tree is highly prized. The fruit is often eaten, and the seeds give an oil used for burning in Malabar.

			lbs.
O	206.	Garhwal (1868)	65
O	536.	Dehra Dún	65
C	191.	Mandla, Central Provinces (1870)	66
C	1110.	Ahiri Reserve, Central Provinces	66
C	2769.	Melghát, Berar	62
W	732.	South Kanara	70
B	319.	Burma (1867)	75
B	2515.	" (1862)	72
No.	47.	Ceylon Collection	57

4. SAPINDUS, Plum.

Four species according to the Flora Indica, but the nomenclature of Beddome and Brandis has been altered by Hiern; it will be convenient to use Brandis' names instead of those given in the Flora Indica. *S. Danura,* Voigt; Hook. Fl. Ind. i. 684; Kurz i. 298 (*Scytalia Danura,* Roxb. Fl. Ind. ii. 274). Vern. *Nancha, danúra,* Beng., is a small tree of Northern India, Northern and Eastern Bengal, Burma and the Andamans, chiefly in the tidal forests. The wood is said by Home (Sundarbans List, 1872-73) to be white, and to be used in Lower Bengal for boat and house building.

1. S. emarginatus, Vahl.; Beddome t. 154; Brandis 107; Roxb. Fl. Ind. ii. 279. *S. trifoliatus,* Linn.; Hook. Fl. Ind. i. 682. The Soapnut Tree. Vern. *Ritha,* Hind.; *Bara-ritha,* Beng.; *Mukta maya,* Uriya; *Konkúdú,* Tel.; *Pounanga, puvandi,* Tam.; *Thalay marathu, antawála,* Kan.; *Areeta,* Mal.; *Puvella,* Cingh.

A large tree. Wood yellow, hard. Pores large, joined by concentric bands of soft tissue, which contain numerous extremely small pores; intervening are darker coloured bands of firmer tissue, in which the very fine, numerous medullary rays are prominent.

Bengal, South India and Ceylon, often cultivated.

Skinner, No. 114, gives the weight of the wood at 64 lbs., and P = 682; it is sometimes used for building and carts, but the chief use of the tree is on account of its saponaceous berries, which are largely used as a substitute for soap. The root, bark and fruit are used in native medicine, and a semi-solid oil is extracted from the seed.

D 3209. Cuddapah, Madras.

B 2259 (51 lbs.) is a white, moderately hard wood sent by Major Ford from the Andamans in 1866; it perhaps belongs to this species.

2. S. detergens, Roxb. Fl. Ind. ii. 280; Brandis 107. *S. Mukorossi,* Gaertn.; Hook. Fl. Ind. i. 683. The Soapnut of North India. Vern. *Ritha, dodan, kanmar,* Hind.

A handsome deciduous tree with grey bark. Wood light yellow, rough, moderately hard, compact and close-grained; annual rings distinctly marked by a band of white tissue, containing large pores; the pores in the outer portion of each annual ring are very small and unite by narrow, concentric, often interrupted bands of white tissue. Medullary rays not straight, short, fine, numerous, lighter coloured than the intervening tissue. Pores and medullary rays distinctly visible on a vertical section.

Cultivated throughout North-West India and Bengal.

Growth slow, 13 to 15 rings per inch of radius. Weight, 44 lbs. Wood not used.

The fruit is very largely used and exported as a substitute for soap the leaves are given as fodder to cattl and the seeds used in med cine

		lbs
H 117	Waz ri R p Kulu 4 000 feet	41
H 3050	Kepu Sutlej Valley 2 000	

3 S attenuatus, Wall, Hook Fl Ind, i 684, Gamble 22 *Sapindus ruber,* Kurz i 298 *Scytalia rubra,* Roxb Fl Ind ii 272 Vern *Achatta,* Nep *Sirhootu igchu,* Lepcha, *Lal koi pura,* Sylhet

A shrub or small tree with thin grey bark Wood white, moderately hard Annual rings marked by darker lines Pores moderately large, scanty, often in short radial or wavy lines Medullary rays short, white, very fine, numerous

Eastern Himalaya Assam and Eastern Bengal down to Chittagong Flowers red Fruit eaten in Sylhet

F 3272 Western Duars

5 NEPHELIUM, Linn

Four produce c trees *N* *N lypol* Burma

Wood red, hard, prominent wavy concentric bands

1 N Longana, Camb, Hook Fl Ind i 688, Kurz i 294 *Euphoria Longana,* Lamk, Beddome t 156 *Scytalia Longana,* Roxb Fl Ind ii 270 The Longan Vern *Ashphal,* Beng, *Poovati,* Tam, *Puna,* Courtallum, *Wumb,* Bombay, *Mal akcota,* Kan, *Kyetmouk,* Burm *Morre,* Cingh

A moderate sized evergreen tree Wood red, moderately hard Pores small, numerous, uniformly distributed, the transverse diameter equal to the distance between the fine and very fine medullary rays Prominent, wavy bands, broader than the rays, divide the wood into a succession of concentric strata which may possibly indicate the annual growth

Mysore Western Ghâts and Burma It is also found in China, where it is called *Longan*

Weight 44lbs Wallich No 179 62 lbs A Mendis our specimens give 51 lbs per cubic foot The wood is not used though Kurz says it is good for furniture but it deserves notice The fruit (the Longan) is eaten.

		lbs
D 1278	Anamalai Hills Madras	51
No 57	Ceylon Collection	62

2 N Litchi, Camb, Hook Fl Ind. i 687, Kurz i 283 *Scytalia Litchi,* Roxb Fl Ind ii 269 The Litchi Vern *Litchi,* Hind (originally Chinese), *Kyetmouk,* Burm

A handsome evergreen tree with thin grey bark Wood red, hard, heavy Pores small to moderate sized, the transverse diameter usually greater than the distance between the rays Medullary rays very fine, very numerous Prominent wavy bands, as in *N Longana*

Introduced from South China, and now cultivated largely in India f r delicious fruit Weight, about 55 lbs per cubic foot

O 3200 Saharanpur

6. POMETIA, Forst.

1. P. tomentosa, Bth. and Hook. f.; Hook. Fl. Ind. i. 691; Kurz i. 295. *Pometia eximia*, Beddome t. 157. Vern. *Thabyay*, Burm.; *Badoh*, And.

Under this name was collected by Kurz, in 1866, in the Andaman Islands, No. B 1973. It has a red heartwood, large, scanty, uniformly distributed pores, prominent on a vertical section; and closely packed, very fine medullary rays; the wood is traversed by prominent concentric lines, which may possibly be annual rings. Weight, 48 lbs. per cubic foot.

7. ACER, Tournef.

A large genus of European, Asiatic and American trees, which counts about 14 Indian species. The species not here described are *A. niveum*, Bl.; Hook. Fl. Ind., i. 693; Kurz i. 289, a very large tree of Assam and Burma; *A. stachyophyllum*, Hiern; Hook. Fl. Ind. i. 694, a small tree of Independent Sikkim; *A. isolobum*, Kurz; Hook. Fl. Ind. i. 694; Kurz i. 289, an evergreen tree of the Martaban Hills from 5,000 to 7,000 feet elevation; and *A. pentapomicum*, J. L. Stewart; Hook. Fl. Ind. i. 694; Brandis 111. Vern. *Teekan, kakkri, kitla, tian, kilpattai, serán*, Pb., a tree of hot dry places in the inner ranges of the North-West Himalaya from Kashmir to Kumaun.

The species may thus be distinguished by characters taken almost exclusively from the leaves:—

Leaves undivided—
  Basal nerves 3—
    Leaves white beneath—
      Cymes pubescent . . . . *A. oblongum.*
      „ glabrous . . . . *A. niveum.*
    Leaves green beneath . . . . *A. lævigatum.*
  Basal nerves 5—
    Leaves glabrous beneath—
      Branches green, serratures of leaves none or very indistinct . . . . *A. sikkimense.*
      Branches red, leaves finely duplicate-serrate . . *A. Hookeri.*
    Leaves pubescent beneath . . . . . . *A. stachyophyllum.*
Leaves 3-lobed—
  Lobes less than half the length of the leaves . . . . *A. Thomsoni.*
  Lobes deeper than half the length of the leaves—
    Lobes lanceolate, acutely serrulate . . . . *A. isolobum.*
    Lobes ovate, obtusely serrate . . . . . . *A. pentapomicum.*
Leaves 5-lobed and nerved—
  Leaves pale beneath . . . . *A. cæsium.*
  Leaves green beneath—
    Leaves large, serratures distant, simple . . . . *A. villosum.*
    Leaves small, serratures close, sharp . . . . *A. caudatum.*
Leaves 5- to 7-lobed and usually 7-nerved—
    Leaves serrulate . . . . *A. Campbellii.*
    Leaves entire . . . . *A. pictum.*

The wood of *Acer* is generally shining and mottled by the medullary rays being prominent on a radial section. It is soft and close-grained. There is no heartwood, and the annual rings are generally well marked. The pores are small and very small, uniformly distributed; the medullary rays fine and very fine, often of two sizes. Concentric medullary patches are found in most species. The structure of the wood of the different species of Maple, European, Indian and American, is so similar that it is very difficult and perhaps impossible to distinguish the different species by the structure of their wood.

1. A. oblongum, Wall.; Hook. Fl Ind. i. 693; Brandis 110; Gamble 22 Vern *Mark*, Pb, *Pharengala, patangalia, kirmoli*, N.-W. P.; *Mugila, buzimpála*, Nep

A moderate-sized deciduous tree Bark dark grey, smooth, with horizontal wrinkles Wood light-reddish brown, moderately hard, close-grained. Annual rings faintly marked. Pores small, uniformly distributed Medullary rays fine, red, distinctly visible on a radial section, giving the wood an elegantly mottled appearance.

Himalaya from the Jhelum eastwards to Bhutan, up to 6,000 feet
Growth moderate, 7 rings per inch of radius Weight, 45 lbs per cubic foot
Wood used for agricultural implements and drinking cups

			lbs
H	221	Garhwal (1868)	45
H	2944	Sutlej Valley, near Suni, 3,000 feet	...

2. A. lævigatum, Wall, Hook Fl. Ind i 693, Brandis 110; Kurz i. 289; Gamble 22. Vern. *Saslendi, cheraunı, thali kabashi*, Nep; *Tungnyok*, Lepcha.

A deciduous tree, with thick, smooth, grey bark. Wood white, shining, hard, close-grained. Pores small, scanty. Medullary rays short, not straight, fine and moderately broad, prominent.

Himalaya from the Jumna eastwards to Bhutan, between 5,000 and 9,000 feet, Khasia Hills, Tenasserim
Weight, 43 lbs per cubic foot Used for planking and tea boxes

			lbs
E	684.	Sepoydura, Darjeeling, 5,500 feet	43

3. A. sikkimense, Miq, Hook. Fl. Ind. i. 694, Gamble 22. Vern. *Palegnyok*, Lepcha.

A small tree, with thin grey bark Wood shining, grey, annual rings distinct Pores small, very numerous Medullary rays fine, numerous

Hills of Sikkim and Bhutan, from 7,000 to 9,000 feet Mishmi Hills
Growth slow, 10 to 15 rings per inch of radius

			lbs
E	3102	Darjeeling, 7,000 feet	37

4. A Hookeri, Miq.; Hook. Fl. Ind. i. 694; Gamble 22. Vern. *Lal kabashi*, Nep; *Palé*, Lepcha.

A deciduous tree with brown bark, ⅛ inch thick, deeply cracked. Wood grey. Pores small. Medullary rays fine, red, very numerous.

Sikkim and Bhutan, above 7,000 feet.
Growth moderate, 8 rings per inch of radius Weight, 37 lbs per cubic foot.
Plants with copper coloured foliage are not uncommon about Darjeeling

			lbs
E	2338.	Rangbul, Darjeeling, 7,500 feet	37

5. A. Thomsoni, Miq; Gamble 22. *A. villosum*, Wall. var.; Hook Fl. Ind. i. 695. Vern *Kabashi, Nep.*

A large tree, bark thin, grey. Wood greyish white, soft. Pores small. Medullary rays fine and moderately broad, numerous.

Hills of Sikkim and Bhutan above 4,000 feet
Growth slow, 16 rings per inch of radius. Weight, 44 lbs per cubic foot

			lbs.
E	3103	Darjeeling, 5 000 feet	44

6. POMETIA, Forst.

1. P. tomentosa, Bth. and Hook. f.; Hook. Fl. Ind. i. 691; Kurz i. 295. *Pometia eximia*, Beddome t. 157. Vern. *Thabyay*, Burm.; *Badoh*, And.

Under this name was collected by Kurz, in 1866, in the Andaman Islands, No. B 1973. It has a red heartwood, large, scanty, uniformly distributed pores, prominent on a vertical section; and closely packed, very fine medullary rays; the wood is traversed by prominent concentric lines, which may possibly be annual rings. Weight, 48 lbs. per cubic foot.

7. ACER, Tournef.

A large genus of European, Asiatic and American trees, which counts about 14 Indian species. The species not here described are *A. niveum*, Bl.; Hook. Fl. Ind., i. 693; Kurz i. 289, a very large tree of Assam and Burma; *A. stachyophyllum*, Hiern; Hook. Fl. Ind. i. 694, a small tree of Independent Sikkim; *A. isolobum*, Kurz; Hook. Fl. Ind. i. 694; Kurz i. 289, an evergreen tree of the Martaban Hills from 5,000 to 7,000 feet elevation; and *A. pentapomicum*, J. L. Stewart; Hook. Fl. Ind. i. 694; Brandis 111. Vern. *Teekan, kakkri, kitla, tian, kilpattai, serán*, Pb., a tree of hot dry places in the inner ranges of the North-West Himalaya from Kashmir to Kumaun.

The species may thus be distinguished by characters taken almost exclusively from the leaves:—

Leaves undivided—
  Basal nerves 3—
    Leaves white beneath—
      Cymes pubescent . . . . *A. oblongum.*
      „ glabrous . . . . *A. niveum.*
    Leaves green beneath . . . . *A. lævigatum.*
  Basal nerves 5—
    Leaves glabrous beneath—
      Branches green, ser[illegible] . . . .
      indis[illegible]
H[illegible] Kangra (1866) . . . .

8. A. caudatum, Wall.; Hook. Fl. Ind. i. 695; Brandis 112; Gamble 22. Vern. *Kanzla, kandaru, kanjara*, Simla; *Khansing, kabashi*, Nep.; *Yalishin*, Bhutia.

A moderate-sized deciduous tree, with dark-grey bark. Wood white, with a faint pink tinge, shiny, compact, moderately hard, sometimes with small masses of heartwood near the centre. Annual rings distinct. Pores small, uniform and uniformly distributed. Medullary rays moderately broad, short, giving on a radial section a beautifully mottled appearance.

Himalaya, from the Chenab to Bhutan between 7,000 to 11,000 feet.
Growth slow, 26 rings per inch of radius. Weight, 43 lbs. per cubic foot.

				lbs.
H	27.	Matiyána, Simla,	7,000 feet	45
H	41.	Mahasu, „	8,000 „	44
H	74.	Kalashi, „	6,000 „	41
H	3007.	Nagkanda, „	9,000 „	...

9. A. Campbellii, Hook. f. and Th.; Hook. Fl. Ind. i. 696; Gamble 23. Vern. *Kabashi*, Nep.; *Daom, yatli*, Lepcha.

A large deciduous tree, with smooth grey bark. Wood greyish white, moderately hard, shining, close-grained. Annual rings marked by a thin line. Pores small, uniformly distributed. Medullary rays numerous, fine and moderately broad.

1. A oblongum, Wall , Hook Fl Ind i 693, Brandis 110, Gamble 22 Vern *Mark*, Pb , *Pharengala, patangalia, kirmoli*, N -W P , *Mugila, bu impála*, Nep

A moderate sized deciduous tree Bark dark grey, smooth, with horizontal wrinkles Wood light reddish brown, moderately hard, close grained Annual rings faintly marked Pores small, uniformly distributed Medullary rays fine, red, distinctly visible on a radial section, giving the wood an elegantly mottled appearance

Himalaya from the Jhelum eastwards to Bhutan up to 6 000 feet
Growth moderate 7 rings per inch of rad us Weight 45 lbs per cubic foot Wood used for agricultural implements and drinking cups

			lbs
H	221	Garhwal (1868)	45
H	2944	Sutlej Valley near Suni 3 000 feet	

2 A lævigatum, Wall , Hook Fl Ind i 693, Brandis 110, Kurz i 289, Gamble 22 Vern *Saslendi, cheraun, thali kabashi*, Nep , *Tungnyok*, Lepcha

A deciduous tree, with thick, smooth, grey bark Wood white, shining, hard, close grained Pores small, scanty Medullary rays short, not straight, fine and moderately broad, prominent

Himalaya from the Jumna eastwards to Bhutan between 5 000 and 9 000 feet, Khasia Hills Tenasserim
Weight, 43 lbs per cubic foot Used for planking and tea boxes

			lbs
E	681	Sepoydura Darjeeling 5 500 feet	43

3 A sikkimense, Miq , Hook Fl Ind i 694, Gamble 22 Vern *Paleam ok*, Lepcha
Brandis 110, Kurz i ... , Gamble 22 ... grey, annual
lifolia, Linn f , Roxb Fl Ind ii 256 Vern *Sanu* ... *endru, ban mendu*, Pb , *Banderu*, C P , *Baidurgi, bandrike*, Kan

An evergreen shrub, with thin grey bark exfoliating in long thin strips Sapwood white, heartwood extremely hard and close grained, dark brown, with an irregular outline, annual rings (?) distinctly marked by fine white lines Pores very small, in short radial lines Medullary rays fine, white, very numerous

... Punjab Sindh South
small tree Burma

sed for engraving
port the earth of
like the Siwalik

Hill of Hoshiarpur

P	891	Salt Range Punjab

9 STAPHYLEA, Linn

1 S Emodi, Wall , Hook Fl Ind i 698, Brandis 114 Vern ... , *chitra, chual, ban-bakhru, ban-*

grey with darker longitudinal,
Pores very small between the

North-West Himalaya, above 6,000 feet.

Sticks are made of the wood which are sold in the hill bazars. They are supposed by the Afghans and frontier tribes to have the property of keeping off snakes. Weight, 44 lbs. per cubic foot.

		lbs.
H 2900.	Nagkanda, Simla, 8,000 feet	41
H 3189.	Dungagalli, Hazara, 7,000 feet	47

10. TURPINIA, Vent.

Contains 2 Indian species, which in the Flora Indica are described as one. *T. pomifera*, DC., Kurz i. 292; Gamble 23. Vern. *Nagpat*, Nep.; *Singnok*, Lepcha; *Toukshama*, Burm., is a tree of the tropical forests of Bengal and Burma: while *T. nepalensis* comes from the hills.

1. T. nepalensis, Wall.; Beddome t. 159; Kurz i. 292; Gamble 23. *T. pomifera*, DC.; Hook. Fl. Ind. i. 698. Vern. *Thali*, Nep.; *Murgut*, Lepcha; *Nilà*, Nilgiris.

A moderate-sized deciduous tree. Bark $\frac{1}{10}$ inch thick, grey, smooth. Wood grey, soft, even-grained. Pores small, very numerous, uniformly distributed. Medullary rays of two classes, the first being moderately broad, scanty, short, and the second fine, very numerous.

Himalaya from the Nepal Frontier eastwards, between 4,000 and 7,000 feet, Assam, Cachar, Chittagong and Burma.

Weight, 30 lbs per cubic foot. Wood not used, leaves given as fodder to cattle.

		lbs.
E 649.	Sepoydura Forest, Darjeeling, 5,500 feet	30
E 3108.	Darjeeling, 6,000 feet	...

ORDER XXXV. SABIACEÆ.

Contains 2 Indian genera, *viz.*: *Meliosma*, which is here described, and comprises trees or shrubs; and *Sabia*, a genus of about 10 climbing or sarmentose shrubs. Among these latter *S. campanulata*, Wall.; Hook. Fl. Ind. ii. i; Brandis 116. Vern. *Bakalpata*, Kumaun, of the Himalaya from Simla to Sikkim, above 5,000 ft. (H 3030, Nagkanda, 9,000 ft.; H 3193, Theog. 7,000 ft.); *S. paniculata*, Edgew.; Hook. Fl. Ind. ii. 3; Brandis 117; Gamble 23 of the Sub-Himalayan tract from the Jumna to Sikkim and *S. leptandra*, Hook. f. and Th.; Hook. Fl. Ind. ii. 2; Gamble 23. Vern. *Simali*, Nep.; *Payongrik*, Lepcha, of the Sikkim Hills, are the most noticeable. They have a soft wood, with large pores and broad medullary rays.

1. MELIOSMA, Blume.

A genus containing 7 species of Indian trees. Two are found in North-West India, four in the Eastern Himalaya, one in Burma and three in South India. Of those not here described, *M. pungens*, Wall.; Brandis 116. Vern. *Gardar*, *kharas*, Kumaun, is a tree of the North-West Himalaya from the Indus to Nepal, but rare west of the Sutlej; *M. Wightii*, Planch. (*M. pungens*, Bedd. lxxvii). Vern. *Tode*, Nilgiris, is a tree of the Western Ghâts often called Hill Mango by Europeans, but not used; *M. Arnottiana*, Wight; Beddome t. 160. Vern. *Huli makay*, Nilgiris; *Massivâra*, Mysore, is a large tree of the hills of South India, above 4,000 ft. elevation. Beddome says the heartwood of old trees is striped red and white, but that the timber is worthless. *M. pinnata*, Roxb. Fl. Ind. i. 104; Gamble 23. Vern. *Bolay*, Nep.; *Batiwa*, Sylhet, is a large tree of the outer Eastern Himalaya and Khasia Hills, whose wood is used for house-building.

Pores small, arranged in groups, or in short radial lines.

1. M. dilleniæfolia, Bl.; Hook. Fl Ind ii. 4, Brandis 115; Gamble 23. Vern. *Porda, parenga, philli,* Simla; *Gwep,* N.-W. P.

A small deciduous tree, with dark-grey bark. Wood white, soft, even-grained. Annual rings marked by a continuous line of pores. Pores small, in rounded groups of from ten to twenty, except along the annual rings. Medullary rays wavy, moderately broad and fine, distinctly marked on a radial section.

Throughout the Himalaya, from 4,000 to 11,000 feet, from the Sutlej to Bhutan Growth moderate, 4 to 6 rings per inch of radius, weight, 35 to 38 lbs per cubic foot

			lbs
H	60	Nagkanda, Simla, 8,000 feet	38
H	2892	" " "	35

2. M. simplicifolia, Roxb Fl. Ind. i. 103; Hook Fl. Ind. ii. 5; Beddome lxxvii.; Brandis 116; Kurz i 301; Gamble 23. *Millingtonia,* Roxb. Vern. *Kosrú,* Nep.; *Hingman,* Lepcha, *Koko,* Mechi; *Dibrú,* Ass; *Dantrungi,* Sylhet, *Rong,* Chittagong; *Gokpak,* Magh.

An evergreen tree. Wood reddish, moderately hard, warps. Pores small and moderate-sized, single or in short radial lines, numerous, uniformly distributed. Medullary rays moderately broad, very numerous.

Eastern Himalaya, Assam, Chittagong, Burma, South India and Ceylon Weight, 36 lbs per cubic foot

		lbs
E 2339.	Sivoke, Darjeeling Terai . . .	36

3. M. Wallichii, Planch.; Hook. Fl. Ind. ii. 6, Gamble 24. Vern. *Dabdabbi, nunewalai,* Nep; *Himan,* Lepcha.

A large deciduous tree. Wood white, very soft, spongy. Pores large, in scattered groups of five to ten. Medullary rays broad and fine, distinctly marked on a radial section.

Eastern Himalaya and Khasia Hills, above 5,000 feet Growth moderate, 8 to 10 rings per inch of radius Weight, 18 lbs per cubic foot Wood used only for firewood and occasionally for boxes

		lbs
E 361	Rangbúl, Darjeeling, 7,000 ft . .	18

ORDER XXXVI. ANACARDIACEÆ.

Tribe I.—Anacardieæ . . . *Rhus, Pistacia, Mangifera, Anacardium, Bouea, Gluta, Buchanania, Melanorrhœa, Swintonia, Solenocarpus, Tapiria, Odina, Parishia, Semecarpus, Drimycarpus, Holigarna* and *Nothopegia.*

" II—Spondieæ . . . *Spondias* and *Dracontomelum.*

the rest *Tapiria* contains only
ern Bengal down to Chittagong.
Mashul lara, Nep, *Renchiling-*
which are found in Tenasserim,

while of the third, *S. Schweckii*, Teysm. and Binnend.; Hook. Fl. Ind. ii. 26; Kurz i. 316, herbarium specimens were sent from Chittagong accompanying E 1964. Vern. *Bailum, boilsur*, Beng.; *Sambúng, sanginphroo*, Magh; *Shibika*, Chakma; *Thayet san*, Burm., which has unfortunately been mislaid. It is a very large tree of the Eastern Peninsula from Chittagong southward and, especially in Chittagong, is remarkable by its tall straight, white stem and handsome foliage, which is tinged with red in the cold season. The wood is sometimes used for boats and is said by Major Lewin to last better than other woods in salt water. *Solenocarpus indica*, W. and A.; Beddome t. 233, is a tree of the Western Gháts. *Parishia insignis*, Hook. f. is a large handsome evergreen tree of Tenasserim and the Andaman Islands. *Nothopegia* contains three small trees of the Western Gháts; and *Dracontomelum mangiferum*, Bl. Vern. *Gunraduh*, And., is a large evergreen tree of the Andaman Islands.

According to the structure of the wood the genera of this family may be divided into two series. The first series which comprises *Melanorrhœa, Gluta, Bouea* and *Mangifera* is characterized by closely packed medullary rays and somewhat scanty pores, of these the first three genera have hard and dark-coloured heartwood. The second series comprises *Rhus, Pistacia, Anacardium, Semecarpus, Odina, Buchanania, Spondias,* and *Drimycarpus*, and is marked by numerous fine, medullary rays, which are not closely packed, and numerous small or moderate-sized pores. The wood of the genera of this group is soft, and except that of *Pistacia, Rhus* and *Odina*, has no heartwood. The heartwood of *Pistacia* is hard and that of *Odina* moderately hard.

1. RHUS, Linn.

Contains 11 species, chiefly Himalayan. *Rhus parviflora*, Roxb. Fl. Ind. ii. 100; Brandis 119. Vern. *Túnga, rai túng, dungla, túmra, ranel*, Hind., is a shrub of dry slopes of the N.-W. Himalaya and of the hills of Central India, with a yellowish, close-grained wood. *R. khasiana*, Hook. f. and *R. Griffithii*, Hook. f. are small trees of the Khasia Hills and Chittagong, while *R. paniculata*, Wall., is found in Bhutan and in Burma. *R. Coriaria*, Linn., is the Sumach tree of Europe, whose leaves are used in tanning in the preparation of Morocco leather.

Wood grey, soft except in *R. mysorensis*, often streaked, with a yellow or brown heartwood. Pores small, often large and in continuous porous belts in the spring wood. Medullary rays fine and moderately broad.

1. R. Cotinus, Linn.; Hook. Fl. Ind. ii. 9; Brandis 118. Vern. *Paán, bhán, manu, banthra, túng, titri*, Pb.; *Túnga, tung, chaniát, ámi*, N.-W. P.

A shrub or small tree, deciduous. Bark thin, reddish brown, rough. Wood moderately hard; sapwood small, white; heartwood mottled, of a rich dark yellow colour. Annual rings marked by a belt of moderate-sized and large pores, the pores in the autumn wood very small, arranged in long, irregular, radial groups. Medullary rays fine, short.

Suliman Range, North-West Himalaya to Kumaun, ascending to 6,000 feet.

Growth slow, 32 rings per inch of radius. Weight, 56 lbs. per cubic foot. Used in South Europe for inlaid and cabinet work. In the Himalaya the twigs are used for basket-making, and the bark and leaves for tanning.

			lbs.
H	85.	Bhajji, Simla, 6,000 feet	56
H	3182.	Dungagalli, Hazara	...

2. R. mysorensis, Heyne; Hook. Fl. Ind. ii. 9; Beddome lxxviii.; Brandis 119. Vern. *Dasarni*, Ajmere.

A small shrub with thin brown bark. Wood hard, pinkish yellow, close-grained, heavy. Pores moderate sized, evenly distributed. Medullary rays fine, very numerous, wavy, bent where they touch the pores.

Suliman Range, Sind, Punjab, Rajputana and the Dekkan. Wood used only for fuel.

P 3231	Nagpahar Forest, Ajmere	
P 3218	Ajmere	

3. **R. semialata**, Murray; Hook. Fl. Ind. ii. 10; Brandis 119; Gamble 24. *R. buckiamela*, Roxb. Fl. Ind. ii. 99. *R. javanica*, Linn.; Kurz i. 319. Vern. *Tatri, titri, chechar, arkhar, arkol, kakri, didla, kakkeran, wansh, hulashing*, Pb.; *Rashtu*, Sutlej; *Dakhmila, daswila*, N. W. P.; *Bakkiamela, bhagmili*, Nep.; *Takhril*, Lepcha.

A moderate sized deciduous tree. Bark ½ inch thick, rough, with deep vertical furrows. Wood soft, shining, grey with darker streaks. Annual rings marked by a broad belt of closely packed large pores, the outer belt of each annual ring being often very narrow, with patches of very small pores. Medullary rays fine.

Outer Himalaya from the Indus to Assam, ascending to 7,000 feet. Khasia Hills.

Growth variable; the Simla specimens had a slow growth of 16 rings per inch, while the Darjeeling specimens had grown very fast, 2·3 rings per inch of radius. Weight 26 to 27 lbs. per cubic foot. Wood not used. Fruit eaten by Nepalese and Lepchas, who make a wax of it called *Omlu*, Nep.

			lbs.
H	89	Bhajji, Simla, 5,000 feet	26
H	2912	Suni, Sutlej Valley, 3,000 feet	27
H	3079	Annandale, Simla, 6,000 feet	..
E	2310	Tukdah, Darjeeling, 5,000 feet	27

4. **R. punjabensis**, J. L. Stewart; Hook. Fl. Ind. ii. 10; Brandis 120. Vern. *Titri, arkhar, palai, choklu, kangar, kakkrein, dor, rashtu*, Punjab.

A moderate sized deciduous tree, with rough dark grey bark and scented aromatic leaves. Wood consisting of alternate layers of soft, porous spring wood and hard autumn wood. Heartwood yellowish grey, with dark longitudinal streaks, moderately hard. Annual rings marked by a broad belt of closely packed large pores; the pores in the rest of the annual rings scattered, small or very small, in groups or patches of soft tissue.

North-West Himalaya, ascending to 8,500 feet.

Growth slow, 11 rings per inch of radius. Weight 34 lbs. per cubic foot.

			lbs.
H	19	Matiyana, Simla, 8,000 feet	33
H	3051	Kotgarh, Simla, 7,000 feet	35
H	3170	Dungagalli, Hazara	..

5. **R. insignis**, Hook. f.; Hook. Fl. Ind. ii. 11; Gamble 24. Vern. *Kagphulai*, Nep.; *Serh*, Lepcha.

A moderate sized tree, with thin grey bark. Wood grey, soft; heartwood yellowish brown. Pores small and moderate sized, uniformly distributed. Medullary rays fine, numerous.

Sikkim and the Khasia Hills, above 4,000 feet.

Growth fast, 3 to 4 rings per inch of radius.

			lbs.
E	3104	Darjeeling, 7,000 feet	[illegible]
E	3105	Darjeeling, 7,000 feet	[illegible]

6. **R. Wallichii**, Hook. f.; Hook. Fl. Ind. ii. 11. *R. vernicifera*, DC.; Brandis 120. Vern. *Kambal, gadúmbal, rikhali, arkhar, arkol, lohása, harkú*, Punjab; *Akoria, kaunki, bhalián*, N.-W. P.; *Bhálaio, chosi*, Nep.

A small or moderate-sized tree, exuding, from between the bark and the wood, a black acrid varnish, which draws blisters. Sapwood white, soft; heartwood reddish brown, yellow when dry (*Brandis*). Structure similar to that of *R. semialata*.

N.-W. Himalaya, from 2,000 to 7,000 feet.

The wood is used in the Sutlej Valley for saw frames and axe handles. The juice of the leaves is corrosive and blisters the skin.

H 3078. Annandale, Simla, 6,000 feet.

7. **R. succedanea**, Linn.; Hook. Fl. Ind. ii. 12; Roxb. Fl. Ind. ii. 98; Brandis 121. *R. acuminata*, DC.; Gamble 24. Vern. *Tatri, arkol, titar, lakhar, rikhúl, shash, hurku*, Pb.; *Raniwalai*, Nep.; *Serhnyok*, Lepcha; *Dingkain*, Khasia.

A small deciduous tree, with thin bark. Wood white, shining, soft, with a small darker-coloured heartwood. Structure similar to that of *R. semialata*.

Himalaya, from the Jhelum to Assam, Khasia Hills, from 2,000 to 8,000 feet.

The wood is not used. The juice is acrid and causes blisters, the seeds give a good wax, and the tree is planted in Japan along roads and regularly worked for this wax, which is of a snow-white colour and is made into candles.

		lbs.
H 2907.	Nagkanda, Simla, 7,000 feet	32
H 3167.	Dungagalli, Hazára	...

2. PISTACIA, Linn.

Contains only one Indian species. The pistachio nuts (*pista*), which are imported into India from Afghanistan, are the produce of *Pistacia vera*, Linn., a small tree of Western Asia, cultivated in South Europe. *P. Lentiscus*, Linn., a shrub of the Mediterranean region, is the true Mastic of Chios. *P. Terebinthus*, Linn., the Terebinth Tree, gives the Chio or Cyprus turpentine, and the galls found on it are used in tanning.

1. **P. integerrima**, J. L. Stewart; Hook. Fl. Ind. ii. 13; Brandis 122. Vern. *Kaka, kakkar, kakrangche, kakring, kangar, tungu*, Pb.; *Kakar singi*, Kumaon; *Shué, sarawan, masua*, Afg.

A deciduous tree, with rough grey bark. Sapwood white; heartwood yellowish brown, beautifully mottled with yellow and dark veins, very hard. Annual rings marked by a belt of closely packed pores. Pores of two classes: those in the spring wood moderate-sized, while those in the greater portion of the wood are very small, forming interrupted, wavy lines, and grouped in irregular, narrow patches, which are frequently arranged in zigzag lines. Medullary rays fine, very numerous.

Suliman and Salt Ranges, outer North-West Himalaya, ascending to 6,500 feet and extending east as far as Kumaon.

Growth moderate, 8 to 9 rings per inch of radius. Weight, 54 lbs. per cubic foot. The wood is used for furniture, carvings and all kinds of ornamental work. It is usually sold in the hill bazars and particularly at Simla, in the form of thick short planks. The leaves are lopped for fodder for buffaloes and camels, and the galls are used in native medicine.

			lbs
H	6	Juling Simla 4 000 feet	
H	11	Kombarsen Simla 6 000 feet	50
H	160	Hazara Punjab (1866)	52
H	926	Hazara, Punjab	46
H	898	Murree Punjab 7 000 feet	56
H	227	Garhwal (1868)	60
H	2930	Simla 6 000 feet	63

3 MANGIFERA, Linn

Besides the 3 species here described *M longipes* Griff Kurz i 303 Vern *Thayet thee nee* Burm is an evergreen tree of the swamp forests of Burma, and *M fœtida* Lour Vern *Lamote*, Burm a large tree cultivated in Southern Tenasserim for its fruit

No heartwood Wood soft, somewhat spongy Pores large, prominent on a vertical section Medullary rays fine, generally closely packed Numerous, fine, wavy, concentric lines

1 M indica, Linn, Hook Fl Ind ii 13, Roxb Fl Ind i 641, Beddome t 162, Brandis 125, Kurz i 304, Gamble 24 The Mango Tree Vern *Am*, Hind , *Ghari am*, Ass , *Jegachu*, Garo , *Marka*, Gondi , *Ambe*, Kurku , *Amba*, Mar , *Maa, mangas*, Tam , *Mamadi, mamid*, Tel , *Maraena, mavu*, Kan , *Maca*, Mal , *Thayet*, Burm

A large evergreen tree Bark thick, dark grey, nearly black, rough with numerous small fissures and exfoliating scales Wood grey, coarse-grained, soft Pores scanty, moderate sized and large, distinctly marked on a longitudinal section Medullary rays fine, wavy, closely packed

Wild on the Western Ghâts cultivated all over India

42 (Skinner, No 90),

41

× 1″ gave P = 587,

Cunningham's two experiments and Baker's with bars 6 × 2 × 2′ ... low frames in Calcutta for and Masula boats are made of it

			lbs
F	637	Goalpara Assam	48
B	2302	Assam	38
F	3131	Calcutta	41
E	1907	Chittagong	39
D	2003	Mysore	39

2 M. caloneura, Kurz i 305, Hook Fl Ind ii 14 Vern *Taunthayet*, Burm

An evergreen tree Wood light brown, moderately hard Pores large, scanty, prominent on a vertical section Medullary rays fine, very numerous Fine, wavy, concentric lines

Burma

Weight 35 lbs per cubic foot

			lbs
B	294	Burma (1867)	38
B	2519	(1862)	

6. R. Wallichii, Hook. f.; Hook. Fl. Ind. ii. 11. *R. vernicifera*, DC.; Brandis 120. Vern. *Kambal, gadúmbal, rikhali, arkhar, arkol, lohása, harké*, Punjab; *Akoria, kaunki, bhalián*, N.-W. P.; *Bhálaio, chosi*, Nep.

A small or moderate-sized tree, exuding, from between the bark and the wood, a black acrid varnish, which draws blisters. Sapwood white, soft; heartwood reddish brown, yellow when dry (*Brandis*). Structure similar to that of *R. semialata.*

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The wood is not used. The juice is acrid and causes blisters, the seeds give a good wax, and the tree is planted in Japan along roads and regularly worked for this wax, which is of a snow-white colour and is made into candles.

		lbs.
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H 3167.	Dungagalli, Hazára	...

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A deciduous tree, with rough grey bark. Sapwood white; heartwood yellowish brown, beautifully mottled with yellow and dark veins, very hard. Annual rings marked by a belt of closely packed pores. Pores of two classes: those in the spring wood moderate-sized, while those in the greater portion of the wood are very small, forming interrupted, wavy lines, and grouped in irregular, narrow patches, which are frequently arranged in zigzag lines. Medullary rays fine, very numerous.

Suliman and Salt Ranges, outer North-West Himalaya, ascending to 6,500 feet and extending east as far as Kumaon.

Growth moderate, 8 to 9 rings per inch of radius. Weight, 54 lbs. per cubic foot. The wood is used for furniture, carvings and all kinds of ornamental work. It is usually sold in the hill bazars and particularly at Simla, in the form of thick short planks. The leaves are lopped for fodder for buffaloes and camels, and the galls are used in native medicine.

			lbs
H	6	Julung Simla 4 000 feet	
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No heartwood Wood soft, somewhat spongy Pores large, prominent on a vertical section Medullary rays fine, generally closely packed Numerous, fine, wavy, concentric lines

1 M. indica, Linn, Hook Fl Ind ii 13, Roxb Fl Ind i 641, Beddome t 162 Brandis 125, Kurz i 304, Gamble 24 The Mango Tree Vern *Am*, Hind, *Gharı am*, Ass, *Jegachu*, Garo, *Marka*, Gondi, *Ambe*, Kurku, *Amba*, Mar, *Maa, mangas*, Tam, *Mamadi, mamid*, Tel, *Mavena, mavu*, Kan, *Maca*, Mal, *Thayet*, Burm

A large evergreen tree Bark thick, dark grey, nearly black, rough with numerous small fissures and exfoliating scales Wood grey, coarse-grained, soft Pores scanty, moderate sized and large, distinctly marked on a longitudinal section Medullary rays fine, wavy, closely packed

12 (Skinner, No 90),

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× 1" gave P = 587,

Cunningham's two experiments and Baker's with bars 6 × 2 × 2' ... in low frames in Calcutta for and Masula boats are made of it

but germinate well if sown when quite fresh

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F	637	Goalpara Assam	48
B	2302	Assam	38
F	3131	Calcutta	41
E	1?07	Chittagong	39
D	20?3	Mysore	39

2 M caloneura, Kurz i 305, Hook Fl Ind ii 14 Vern *Tau-thayet*, Burm

An evergreen tree Wood light brown, moderately hard Pores large, scanty, prominent on a vertical section Medullary rays fine, very numerous Fine, wavy, concentric lines

Burma

Weight 35 lbs per cubic foot

			lbs
B	294	Burma (1867)	
B	2519	(1862)	

3. M. sylvatica, Roxb. Fl. Ind. i. 644; Hook. Fl. Ind. ii. 15; Kurz i. 304; Gamble 24. Vern. *Bun am,* Ass.; *Lakshmi am,* Sylhet; *Chuchi am,* Nep.; *Katúr,* Lepcha; *Hseng neng thayet,* Burm.

A large evergreen tree with a thick grey bark. Wood grey, moderately hard. Structure the same as that of *M. caloneura,* but the medullary rays are less distinct and less numerous. Numerous wavy, concentric lines.

Nepal, Eastern Bengal and the Andamans; rare in Burma.

Weight, 34 to 41 lbs. Wood not used, but worth trial for tea boxes. The fruit is sometimes eaten fresh or dried. It is also used medicinally. (*Roxb.*)

		lbs.
E 594.	Kookloong Forest, Darjeeling Terai	41
E 952.	Golaghát, Assam	34

4. ANACARDIUM, Rottb.

1. A. occidentale, Linn.; Hook. Fl. Ind. ii. 20; Roxb. Fl. Ind. ii. 312; Beddome t. 163; Kurz i. 310. The Cashew Nut Tree. Vern. *Kajú,* Hind.; *Hijuli,* Beng.; *Kola mava, mundiri,* Tam.; *Jidi mamidi,* Tel.; *Jidi, Kempu géru,* Kan.; *Thee-hoh thayet,* Burm.

A small evergreen tree, with rough bark. Wood red, moderately hard, close-grained. Pores large, prominent on a vertical section. Medullary rays indistinct.

Originally from South America, now established in the coast forests of Chittagong, Tenasserim, the Andaman Islands and South India.

Growth moderate, 8 to 11 rings per inch of radius. Weight, 38 to 39 lbs. per cubic foot. The wood is used for packing cases in Burma, for boat-building and charcoal. The nuts are roasted and eaten as dessert, they also give, by expression, a yellow oil similar to almond oil. The pericarp of the fruit gives a black acrid oil which is called 'cardol' and gives an acid called 'anacardic acid.' The oil is very caustic, raises blisters and is used for warts, corns, and ulcers; it is also used to prevent the attacks of white ants to wood-work and of insects to the binding of books, and in the Andamans to colour and preserve fishing lines; the enlarged pedicels of the fruit are eaten.

		lbs.
B 2227	. . . .	38
B 2229.	Andamans (1866)	39

5. BOUEA, Meissner.

1. B. burmanica, Griff.; Hook. Fl. Ind. ii. 21. *B. oppositifolia,* Meissn.; Kurz i. 306. *Mangifera oppositifolia,* Roxb. Fl. Ind. i. 640. Vern. *Meriam, mayan,* Burm.

A moderate-sized evergreen tree with dark-grey bark. Wood grey, hard, with a dark reddish brown heartwood. Pores scanty, moderate-sized, prominent on a vertical section. Medullary rays fine, numerous, undulating. Wavy concentric lines dividing the wood into a succession of concentric bands, which may possibly be annual rings.

Burma and Andaman Islands.

Weight, 55 lbs. per cubic foot. The wood is not specially used, but is said by Roxburgh to be very durable. The tree has an edible fruit, for which it is often cultivated.

		lbs.
B 2213.	Andamans (1866)	55

6. GLUTA, Linn.

Contains 3 species: one (that here described) from South India and two from Burma, *viz.* *G. tavoyana*, Wall.; Hook. Fl. Ind. ii. 22; Kurz i. 309. Vern. *Thayet thitsay*, Burm.; and *G. elegans*, Wall.; Kurz i. 309: small trees of the Tenasserim coast. Kurz says that the wood when steeped in ferruginous mud turns jet black, looking like ebony, and that it is used for building, for boxes and for dyeing.

1. G. travancorica, Beddome t. 60; Hook. Fl. Ind. ii. 22. Vern. *Shencurungi*, Tinnevelly.

A very large evergreen tree, bark ⅛ inch thick, grey. Sapwood light-reddish grey; heartwood dark red, very hard and close-grained, beautifully mottled with dark and light streaks. Pores moderate-sized, scanty, filled with resin. Medullary rays very fine, very numerous, prominent, visible on a radial section as narrow bands. Numerous white, undulating, concentric lines and bands, of lighter colour in the wood.

[illegible] of radius. Weight, according to Beddome, [illegible]ive 46 and 58 lbs. The wood is little used, but [illegible]ld rapidly bring it to notice as a valuable wood for furniture. It seems to season very well, and works and polishes admirably.

			lbs.
D 1066	Tinnevelly	(some sapwood)	46
D 3155	„	(heartwood only)	58

7. BUCHANANIA, Roxb.

A genus of 7 Indian species, most of which are trees from Tenasserim and the Andaman Islands. *B. angustifolia*, Roxb. Fl. Ind. ii. 386; Hook. Fl. Ind. ii. 23; Beddome lxxix. Vern. *Sara, chara, pedda morali*, Tel., is a small tree of South India.

1. B. latifolia, Roxb. Fl. Ind. ii. 385; Hook. Fl. Ind. ii. 23; Beddome t. 165; Brandis 127; Kurz i. 307. Vern. *Chirauli*, Pb.; *Pial, payála, muriá, katbhilawa*, Garhwal; *Piar, peirah*, Oudh; *Achár, char, chironji*, C. P.; *Saraka, herka*, Gondi; *Taro*, Kurku; *Charu*, Uriya; *Kat maá, aima*, Tam.; *Chara, chinna moral, morli*, Tel.; *Charwari*, Hyderabad; *Nuskul, murlalu*, Kan.; *Sir*, Bhil; *Pyal, charoli*, Bombay; *Lamboben, lonepho*, Burm.

A tree, leafless only for a very short time. Bark ½ inch thick, dark grey, sometimes black, rough, tesselated with deep irregular cracks. Wood greyish brown, moderately hard, with a small dark-coloured heartwood. Pores large, round or oval, frequently subdivided, uniform and equidistant, prominent on a longitudinal section. Medullary rays very numerous, fine, reddish, uniform and equidistant, bent outwards where they touch the pores; marked on a radial section as long, narrow, dark-coloured plates, the distance between the rays being less than the transverse diameter of the pores.

Sub-Himalayan tract from the Sutlej eastwards, ascending to 3,000 feet. Throughout India and Burma.

Weight 3[illegible]
gives 33 lbs. [illegible]
boxes, bedstead[illegible]
is used for [illegible]
resemble pistachio nuts, they are largely used in native [illegible]ts, [illegible] oil is extracted from them.

	Rs.
	35
	29
	36
	...
	32

MELANORRHŒA, Wall.

M. glabra, Wall.; Hook. Fl. Ind. ii. a tree of Tenasserim.

1. M. usitata, Wall.; Hook. Fl. Ind. ii. 25; Kurz i. 318. The Manipur; *Thitseeben*, Burm.;

bark. Wood dark red with yellow after long exposure; very hard. Pores moderate divided. Each pore or group of pores light tissue. Medullary rays very fine, wavy, numerous. white, undulating, concentric lines of softer tissue, unequally in the wood.

Manipur and Burma.

The following experiments to determine the weight and transverse strength:

	Weight.	Value of P.
Benson, in Burma, with bars	found 61 lbs.	526
Skinner, in 1862, No. 91.	" 61 "	514
Brandis' Burma List, 1862, No. 11	" 51 "	...
Smythies found the average of our two specimens	" 59 "	...

The wood is used for tool handles, and ks, and has lately been recommended for building, railway sleepers, gun-sto ther purposes. It gives a black varnish, used to cover buckets to make ight varnish is used by the Burmese in lacquer work, as size in gil -leaf books, and for many other uses. It has been used with great success.

	Rs.
B 5 lmein.	56
B 25 (1862)	62

1. O. Roxb.
Beddome Bran
Kiamil, *mlái*,
ginyan, H *ja*, Bi
Jiyal, *lohar* g.; G
gumpna, *du* *ri*, *du*
Kekeda, K *li*, *pú*
Hneingyoi *abha*
A mode rge
inch thick, s
Sapwood lar od
brown on exp tel
not warp, not F
often subdivi
touch the pore

Sub-Himala
of India and Bu

The following experiments have been made to determine the weight and transverse strength —

		Weight	Value of P
Skinner No 101, 1862	found	50	821
Benson, Burma wood bars 3 × 1 ½ × 1 ½	„	60	281
Brandis, No 46 Burma List 1862	,	65	..
Smythies 1878 our specimens (omitting the very old pieces and sapwood)		50 5	..

The wood is used for spear shafts scabbards wheel spokes cattle yokes oil presses and rice pounders it might be good for cabinet work It has been tried for sleepers both in Madras and in the Oudh and Rohilkhand Line but has not succeeded The tree is pollarded for fodder, especially for elephants, its bark is used for tanning it

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			lbs
H	3019	Kumharsen, Sutlej Valley, 2 500 feet (sapwood)	35
P	447	Ajmere	43
P	3225	Nagpal ar Ajmere	..
O	226	Garhwal (1868)	38
O	2992	(1874)	41
C	202	Mandla, *C P (1870)*	38
C	1103	Ahiri Reserve C P	48
E	661	Bamunpokri Darjeeling Terai	46
E	2342		48
E	1399	Chittagong	41
E	1965		61
B	1414	Tharrawaddy Burma	64
B	2517	Burma (1862)	35
B	516	Andaman Islands	60

10 SEMECARPUS, Linn fil

Contains about 6 Indian species mostly Burmese Amongst them besides the species described the most important are *S travancorica* Beddome t. 232, Hook Fl Ind ii 31 Vern *Natu shengote* Tam , and *S auriculata*, Bedd., large handsome trees of the Tinnevelly and Travancore hills

1. S Anacardium, Linn f , Hook Fl Ind ii 30, Roxb Fl Ind ii 83 , Beddome t 166, Brandis 121, Kurz i 312, Gamble 25 The Marking nut Tree Vern *Bhilawa, bheyla,* Hind , *Bhalai,* Nep , *Bhela, bhelatuki,* Beng , *Bhallia,* Uriya, *Kongki,* Lepcha, *Bawaræ,* Garo, *Kohka, biba,* Gondi, *Shaing, Shayrang,* Tam , *Jiri, jidi, nella-jedi,* Tel , *Gheru, Kari gheru,* Kan , *Bibwa, bibu,* Mar , *Chyai beng,* Burm

A deciduous tree, bark ½ inch thick, dark brown, rough, exfoliating in very irregular inner patches, inner bark fibrous Wood greyish brown, often with yellow streaks, soft, no annual rings Pores scanty, moderate-sized, frequently subdivided, well marked on a vertical section Medullary rays numerous, moderately broad, reddish, prominent on a radial section as long, narrow, dark-coloured plates

Sub-Himalayan tract from the Sutlej eastwards ascending to 3 500 feet, forests of

acrid juice which causes swelling and irritation, and timber-cutters object to felling

			lbs.
O	245.	Garhwal (1868)	35
C	1124.	Ahíri Reserve, Central Provinces	29
C	2751.	Moharli „ „	36
C	2763.	Melghát, Berar	...
C	1249.	Gumsúr, Madras	32

8. MELANORRHŒA, Wall.

Contains 2 species: that here described and *M. glabra*, Wall.; Hook. Fl. Ind. ii. 25; Kurz i. 317. Vern. *Thitseeben*, Burm., a tree of Tenasserim.

1. M. usitata, Wall.; Hook. Fl. Ind. ii. 25; Kurz i. 318. The Varnish Tree of Burma. Vern. *Kheu*, Manipur; *Thitseeben*, Burm.; *Soothan*, Taleing; *Kiahong*, Karen.

A deciduous tree, with dark-grey bark. Wood dark red with yellowish streaks, turning very dark after long exposure; very hard. Pores moderate-sized, not numerous, often subdivided. Each pore or group of pores enclosed in a small patch of light tissue. Medullary rays very fine, wavy, numerous. Numerous white, undulating, concentric lines of softer tissue, unequally distributed in the wood.

Munipur and Burma.

The following experiments have been made to determine the weight and transverse strength:

	Weight.	Value of P.
Benson, in Burma, with bars 3′ × 1·4″ × 1·4″.	found 61 lbs.	526
Skinner, in 1862, No. 91,	„ 61 „	514
Brandis' Burma List, 1862, No. 44	„ 54 „	...
Smythies found the average of our two specimens	59 „	...

The wood is used for tool handles, anchor stocks, and has lately been recommended for building, railway sleepers, gun-stocks and other purposes. It gives a black varnish, used to cover buckets to make them watertight. This varnish is used by the Burmese in lacquer work, as size in gilding, for writing in palm-leaf books, and for many other purposes. It has been used in medicine as an anthelmintic with great success.

			lbs.
B	551.	Moulmein, Burma	56
B	2518.	Burma (1862)	62

9. ODINA, Roxb.

1. O. Wodier, Roxb. Fl. Ind. ii. 293; Hook. Fl. Ind. ii. 29; Beddome t. 123; Brandis 123; Kurz i. 321; Gamble 24. Vern. *Kiamil, kimúl, kamlái, kashmala, jhingan, mowen, mohin, moyen, ginyan*, Hind.; *Garja*, Bijeragogarh; *Bara dabdabbi, halloray*, Nep.; *Jiyal, lohar bhadi*, Beng.; *Gob*, Ajmere; *Wodier, wude*, Tam.; *Gumpini, gumpna, dumpini, dumpri, dumper*, Tel.; *Kaikra, gumpri, gharri*, Gondi; *Kekeda*, Kurku; *Shimti, púnil, gojal*, Kan.; *Moi, moja, moye*, Mar.; *Hneingpyoing*, Magh; *Nabhay*, Burm.

A moderate-sized or large deciduous tree with few branches. Bark ½ inch thick, compact, grey, smooth, exfoliating in small irregular plates. Sapwood large; heartwood light red when fresh cut, turning reddish brown on exposure, moderately hard, close-grained, seasons well and does not warp, not very durable. Pores moderate-sized, uniformly distributed, often subdivided. Medullary rays fine, numerous, short, bent where they touch the pores.

Sub-Himalayan tract from the Indus eastwards, ascending to 4,000 feet. Forests of India and Burma.

The following experiments have been made to determine the weight and transverse strength —

		Weight	Value of P
Skinner No 101 1862	found	50	821
Benson Burma wood bars 3 × 1 4 × 1 4		60	281
Brandis No 46 Burma List 1862		65	
Smythies 1878 our specimens (omitting the very old pieces and sapwood)		50 5	..

The wood is used for spear shafts scabbards wheel spokes cattle yokes oil presses and rice pounders it might be good for cabinet work It has been tried for sleepers both in Madras and in the Oudh and Rohilkhand Line but has not succeeded The tree is pollarded for fodder especially for elephants its bark is used for tanning it

			lbs
H	3019	Kumbarsen Sutlej Valley 2 500 feet (sapwood)	35
P	447	Ajmere	43
P	3 25	Nagpahar Ajmere	-
O	2 6	Garhwal (1868)	38
O	2992	(1874)	41
C	202	Mandla C P (1870)	38
C	1103	Ahiri Reserve C P	48
E	661	Bamunpokri Darjeeling Terai	46
E	2342		48
E	1399	Chittagong	44
E	1965		61
B	1414	Tharrawaddy Burma	64
B	2517	Burma (186-)	35
B	516	Andaman Islands	60

10 SEMECARPUS, Linn fil

Contains about 6 Indian species mostly Burmese Amongst them besides the species described the most important are *S travancorica* Beddome t 232 Hook Fl Ind ii 31 Vern *Nati shengote* Tam and *S auriculata* Bedd large handsome trees of the Tinnevelly and Travancore hills

1 S Anacardium, Linn f , Hook Fl Ind ii 30 , Roxb Fl Ind ii 83 , Beddome t 166 , Brandis 121 Kurz i 312 , Gamble 25 The Marking nut Tree Vern *Bhilawa, bheyla,* Hind , *Bhalai,* Nep , *Bhela, bhelatuki,* Beng , *Bhallia,* Uriya , *Kongki,* Lepcha , *Bawaræ,* Garo , *kohka, biba,* Gondi , *Shaing, Shayrang,* Tam , *Jiri, jidi, nella jedi,* Tel , *Gheru, kari gheru* Kan , *Bibwa, bibu,* Mar , *Chyai beng,* Burm

A deciduous tree, bark ½ inch thick, dark brown, rough, exfoliating in very irregular inner patches, inner bark fibrous Wood greyish brown, often with yellow streaks soft, no annual rings Pores scanty, moderate sized, frequently subdivided, well marked on a vertical section Medullary rays numerous, moderately broad, reddish, prominent on a radial section as long, narrow, dark coloured plates

it; it is not used. The ripe fruit is much used; the fleshy cup is eaten, but is best either dry or roasted. The pericarp contains an acrid juice which is universally used in India for marking ink and in medicine. The ink is improved by the addition of lime water. The green fruit is pounded and made into bird-lime.

		lbs.
C 1157.	Ahiri Reserve, Central Provinces	44
C 2746.	Moharli " "	40
E 578.	Kookloong Forest, Darjeeling Terai	39
E 627.	Bamunpokri " "	30
E 2311.	" " "	33

The Ahiri specimen, C 1157, has pores joined by irregularly-shaped soft tissue across the medullary rays, and has a harder and closer-grained wood than the Darjeeling specimens; the bark is, however, that of *S. Anacardium*, and there is no reason to doubt its identity. The specimens from Darjeeling are marked by the absence of the lines of softer tissue joining the pores, and it may be suggested for investigation whether they do not come from a different species of *Semecarpus*.

11. DRIMYCARPUS, Hook. f.

1. D. racemosus, Hook. f.; Hook. Fl. Ind. ii. 36; Kurz i. 314; Gamble 26. *Holigarna racemosa*, Roxb. Fl. Ind. ii. 82. Vern. *Kagi*, Nep.; *Brong*, Lepcha; *Telsur*, Beng.; *Amdali*, Ass.; *Chengane*, *sangaipru*, *sangryu*, Magh; *Amjour*, Sylhet.

A large evergreen tree. Wood greyish yellow, hard, close-grained. Pores large and moderate-sized, sometimes subdivided, each pore in a narrow white ring. Medullary rays short, moderately broad, uniform and equidistant, joined by innumerable faint, transverse lines.

Eastern Himalaya from 2,000 to 6,000 feet, Khasia hills and Sylhet to Chittagong, Pegu.

Weight, 61 lbs. per cubic foot. Wood used occasionally in Assam for canoes and planking; in Chittagong for boats, for which it is one of the woods most employed. Major Lewin says that boats 50 feet long and 9 feet in girth are sometimes cut.

		lbs.
E 722.	Chittagong	61

12. HOLIGARNA, Ham.

Seven species. *H. Arnottiana*, Hook. f.; Hook. Fl. Ind. ii. 36. (*H. longifolia*, Wt. and Arn.; Beddome t. 167). Vern. *Kagira*, *kutugeri*, Kan.; *Húlgeri*, Bombay, is a large tree of the Western Gháts, where also are found *H. ferruginea*, Marchand. *H. Grahamii*, Hook. f. (*Semecarpus Grahami*, Wight; Beddome lxxix.) and *H. Beddomei*, Hook. f.; *H. Helferi*, Hook. f.; Kurz i. 315 and *H. albicans*, Hook. f., are trees of Burma.

1. H. longifolia, Roxb. Fl. Ind. ii. 80; Hook. Fl. Ind. ii. 37. Vern. *Barola*, Beng.; *Khreik*, Magh.

Wood grey with yellowish streaks, soft. Pores moderately large, sometimes subdivided, uniform, scanty, prominent as dark lines on a vertical section. Medullary rays fine, white, short, equidistant.

Chittagong and Burma.

Wood not used. It, like all the other species, gives a black acrid exudation which raises blisters and is much dreaded by the hill people.

E 3287. Rinkheong Forest, Chittagong.

13. SPONDIAS, Linn.

Contains 3 species, including, besides the one described, *S. acuminata*, Roxb. Fl. Ind. ii. 453, of South India; and *S. axillaris*, Roxb. Fl. Ind. ii. 453, of Nepal.

1 S mangifera, Pers , Hook Fl Ind ii 42, Roxb Fl Ind ii 451, Beddome t 169, Brandis 128, Kurz i 322, Gamble 25 The Hog Plum Vern *Amra, amara ambodha,* Hind , *Amara,* Nep , Ass , *Amna,* Beng , *Ronchiling,* Lepcha, *Tongrong,* Garo, *Kat maa,* Tam , *Aravi mamidi, amatum,* Tel *Katambolam* Mal , *Amb,* Mar , *Amte,* Kan , *Hamara,* Gondi, *Ambera* Kurku, *Puli ille,* Kaders, *Gway,* Burm

A deciduous tree, with smooth, grey bark Wood soft, light grey Pores large, numerous, often subdivided Medullary rays fine and moderately broad, at unequal distances, white, prominent, distinctly marked on a radial section as long narrow plates

Sub Himalayan tract ascending to 3 000 feet in Sikkim dry forests of South India and Burma rare in Central India

Weight 43 lbs (Skinner No 116) our specimens gave an average of 26 lbs Skinner gives P = 614 Wood soft of no value It gives a gum somewhat like gum arabic The fruit is eaten and is pickled and is preserved or made into curries the leaves are acid

		lbs
C 2800	Melghat Berar	
F 499	Kooloong Forest Darjeeling Terai	30
F 1230	Cachar (Vern *Tundur*)	21
F 1107	Sylhet (Vern *Sutring*)	25
B 560	Burma	29

ORDER XXXVII CORIARIEÆ

An Order containing one Indian genus of a single species

1 CORIARIA, Linn

C myrtifolia Linn a shrub of South Europe (*Corroyère* French) has leaves which are used for tanning and dyeing leather its fruit is poisonous *C sarmentosa* is a New Zealand shrub the fruit of which is made into wine by the settlers

1 C nepalensis, Wall , Hook Fl Ind ii 44, Brandis 128 Vern *Masuri, makola,* Hind , *Raselica, archarru, pajerra,* Simla, *Bhojinsi* Nep

A deciduous shrub or small tree Bark reddish brown, rough Wood grey, hard, beautifully mottled, no heartwood Annual rings distinct, marked by a belt of numerous moderate sized pores, the pores of the outer portion of the annual rings are small and often joined by interrupted concentric bands of whitish tissue Medullary rays very broad, short

Outer Himalaya from the Indus to Bhutan ascending to 8 000 feet in the North West and to 11 000 feet in Sikkim

Growth moderate 5 to 6 rings per inch of radius Weight 47 lbs per cubic foot

The wood takes a good polish and is very handsomely marked so it might be used for boxes and small articles At present it is only used for firewood and is often used as such about Simla

			lbs
H 68	Mashobra Simla	7 000 feet	48
H [illegible]	Mahasu	7 500 "	[illegible]
H 2885	Naghanda	8 000 "	[illegible]

ORDER XXXVIII. MORINGEÆ.

1. MORINGA, Juss.

Wood soft, white. Pores large, scanty, usually in groups of two or three. Medullary rays short, moderately broad.

1. M. pterygosperma, Gaertn.; Hook. Fl. Ind. ii. 45; Beddome t. 80; Brandis 129; Kurz i. 68. *Hyperanthera Moringa*, Roxb. Fl. Ind. ii. 368. The Horse Radish Tree. Vern. *Soanjna, sanjna, senjna, sejna, sohajna, sainjan*, Hind.; *Sujuna*, Beng.; *Swanjera*, Sind.; *Munigha*, Uriya; *Morunga*, Tam.; *Saihan, sejan, mūnga, mulaka*, Tel.; *Nuggee*, Kan.; *Daintha, dan-tha-lone*, Burm.

A tree. Bark one inch thick, grey, corky, with longitudinal cracks. Wood soft, white, spongy, perishable. Wood cells large, prominent. Pores large, scanty, often in groups or short radial lines of two or three. Medullary rays short, fine to moderately broad; the distance between them less than the transverse diameter of the pores.

Wild in the Sub-Himalayan tract from the Chenab to Oudh; commonly cultivated in India and Burma.

The tree is pretty; it is generally grown on account of its fruit, which is eaten as a vegetable and is pickled. The root has a strong flavour of horse radish, and is used in medicine as a vesicant. It yields an oil similar to the *Ben oil* of watch-makers, which is not the produce of this but of another species, *M. aptera*, Gaertn., of Africa. It also gives a reddish gum used in native medicine. The leaves and flowers are eaten as well as the fruit, and the branches are lopped for cattle fodder.

E 3214. Calcutta.

2. M. concanensis, Nimmo; Hook. Fl. Ind. ii. 45; Brandis 130. Vern. *Sainjna*, Rajputana.

A tree, bark thick, soft, corky. Wood white, soft, in structure resembling that of *M. pterygosperma*, except that the pores are more variable in size and the medullary rays rather finer.

Rajputana, Sind, Konkan.

Wood apparently not used. The unripe fruit is eaten.

E 3226. Nagpahar, Ajmere.

ORDER XXXIX. CONNARACEÆ.

An Order of little importance, containing 4 genera of Indian trees and shrubs, found in Eastern Bengal, South India and Burma. *Rourea* contains 5 species, four being scandent shrubs from Eastern Bengal, Tenasserim, and the Andamans; and one, *R. santaloides*, Vahl.; Hook. Fl. Ind. ii. 47; Beddome lxxxi. from South India. *Connarus* contains 6 Burmese and two South Indian species: one, *C. paniculatus*, Roxb. Fl. Ind. iii. 139; Hook. Fl. Ind. ii. 52, extending to Chittagong, Sylhet and the Khasia Hills. *Cnestis ramiflora*, Griff.; Hook. Fl. Ind. ii. 54. (*C. platantha*, Griff.; Kurz i. 328.) Vern. *Tankyet louk*, Burm., is a large climbing shrub of Burma; and *Ellipanthus* contains three Burmese shrubs or small trees.

ORDER XL. LEGUMINOSÆ.

The largest Order of Indian trees, shrubs or climbers. It contains about 70 genera containing species distributed over the whole of India, equally in the arid regions of

the Inner Himalaya and in the tropical forests of Malabar and Tenasserim Many of the largest and most important of our forest trees belong to this Order, and with few exceptions they produce valuable timbers It is divided into three Sub-Orders, viz —

I Papilionaceæ
II Cæsalpinieæ
III Mimoseæ

With the exception of the following genera, *Sesbania*, *Butea*, *Erythrina*, *Pongamia*, and a few species of *Dalbergia* (*D lanceolaria* and *paniculata*), the wood of the Leguminosæ is characterised by a distinct, hard, dark-coloured heartwood The pores vary in size, but are generally moderate-sized, large or very large, and enclosed in rings or patches of soft texture, which frequently are confluent, so as to form concentric bands The medullary rays are generally sharply defined, moderately broad and equidistant (exceptions are *Erythrina* and *Albizzia*).

As regards the structure of their wood, leguminous trees may be most conveniently divided into the following groups, which it will be seen do not correspond with the established division of the Order into genera —

A Ougeinia Group

Pores enclosed in elongated patches of soft tissue, which are arranged in more or less concentric lines Exceedingly prominent and straight medullary rays To this group belong *Ougeinia dalbergioides*, *Afzelia bijuga*, *Tamarindus indica*, *Cassia Fistula*, *marginata* and the new *Cassia* from the Andaman Islands

B Prosopis Group

Pores enclosed in irregularly shaped patches of soft tissue, which are more or less united in concentric bands To this group belong *Prosopis spicigera*, and the following species of *Acacia*, viz *Farnesiana*, *Catechu*, *leucophlœa*, *eburnea* and *pennata* *Indigofera*, *Piptanthus* and *Desmodium* are nearly allied to this group, but differ by having the patches of soft tissue more oblique and less concentric

To this group also belongs *Hæmatoxylon campeachianum* or "Logwood"

C Dalbergia Group

Numerous, narrow [illegible] ft tissue, sometimes interrupted To this [illegible] except *D nigrescens*, the identification [illegible] cies of *Pterocarpus*, *Derris robusta*, *Cæsalpinia crista* or "Redwood," and *Baphia nitida*, the "Camwood" or "Barwood" of the West African Coast

D Bauhinia Group

Numerous, regularly [illegible] of soft tissue, which are broader than those [illegible] ns belong *Pongamia glabra*, all species [illegible] issia *Siamea* and *Millettia pendula*

E. Hardwickia Group.

Pores isolated, not enclosed in patches of soft tissue, though they are generally surrounded by narrow rings. Concentric bands of soft tissue are either wanting entirely, or very scanty. The medullary rays are generally undulating. To this group belong *Xylia dolabriformis, Hardwickia, Adenanthera, Piptadenia, Mimosa, Acacia arabica, modesta* and *ferruginea, Cæsalpinia Sappan* and *echinata* (Brazil or Pernambuco wood).

F. Albizzia Group.

Pores isolated, generally large, not enclosed in patches of soft tissue. None or very few concentric lines of soft tissue. To this group belong all species of *Albizzia, Acacia dealbata* and *Melanoxylon, Acrocarpus, Sesbania*, and *Dalbergia nigrescens.*

G. Erythrina Group.

Pores large. Distinguished by broad medullary rays and broad bands of soft tissue which do not always enclose the large pores. To this group belong all species of *Erythrina,* and *Butea frondosa.*

Sub-order I. PAPILIONACEÆ.

Contains 35 genera, divided into 8 tribes, *viz*:—

Tribe	I.—Podalyrieæ	*Piptanthus.*
,,	II.—Genisteæ	*Priotropis* and *Crotalaria.*
,,	III.—Galegeæ	*Indigofera, Colutea, Milletia, Mundulea, Tephrosia, Sesbania* and *Caragana.*
,,	IV.—Hedysareæ	*Lespedeza, Alhagi, Æschynomene, Ormocarpum, Ougeinia* and *Desmodium.*
,,	V.—Viceæ	*Abrus.*
,,	VI.—Phaseoleæ	*Mucuna, Erythrina, Spatholobus, Butea, Dioclea, Pueraria, Cajanus, Cylista* and *Flemingia.*
,,	VII.—Dalbergieæ	*Dalbergia, Pterocarpus, Pongamia* and *Derris.*
,,	VIII.—Sophoreæ	*Dalhousiea, Calpurnia, Sophora, Euchresta* and *Ormosia.*

Many of these, however, contain only small shrubs; such are *Priotropis, Crotalaria, Colutea, Mundulea, Tephrosia, Caragana, Lespedeza, Alhagi, Æschynomene, Ormocarpum, Cajanus, Flemingia, Dalhousiea,* and *Calpurnia*: others only climbing shrubs; such are *Abrus, Mucuna, Spatholobus, Dioclea, Pueraria* and *Cylista.*

Of the genera not here described, *Sophora* contains about six species of which *S. mollis*, Wall.; Brandis 132. Vern. *Arghawán*, Afg.; *Gojár, kún, málan, tilún, kathi, brisari*, Punjab; *Pahar gúngri*, Kumaun, is a yellow-flowered handsome shrub of the Punjab and North-West Himalaya; and *Ormosia travancorica*, Beddome t. 45, is a tree of the Tinnevelly and Travancore Hills.

1. PIPTANTHUS, D. Don.

1. P. nepalensis, D. Don; Hook. Fl. Ind. ii. 62; Brandis 132; Gamble 25. Vern. *Bankaru*, Sutlej; *Shalgari*, Kumaun.

A shrub with greenish grey bark. Wood white. Pores small, in wavy, oblique and concentric bands, except at the inner edge of the annual rings, which are marked by a continuous line of pores. Medullary rays fine, equidistant.

Himalaya from the Sutlej to Bhutan, above 7,000 feet.
Has handsome large yellow flowers and is sometimes planted for ornament in the hills and in Europe.

		lb.
H 3024.	Nagkanda, Simla, 9,000 feet.	40

Priotropis cytisoides, W. and A.; Kurz i. 363; Gamble 25, is a yellow flowered branching shrub of the Eastern Himalaya and Burma. *Crotalaria* contains numerous shrubs of which the most important is *C. juncea*, Linn., the *Sunn* Hemp Plant, commonly cultivated in India.

2. INDIGOFERA, Linn.

Contains a number of Indian species, about 16 of which are shrubs. Few of them are of any importance except the Indigo Plant, *I. tinctoria*, Linn.; Roxb. Fl. Ind. iii. 379; Brandis 135; Vern. *Nil*, Hind., which is extensively cultivated in

1. **I. heterantha**, Wall.; Brandis 135. *I. Gerardiana*, Wall.; Hook. Fl. Ind. ii. 100 (*var.*). Vern. *Kati, khenti, mattu, kats, shagali*, Pb.; *Kathi, theot*, Simla.

A small shrub. Bark ⅛ inch thick, brown, with longitudinal anastomosing lines. Wood hard, white, with an irregular heartwood of dark colour. Annual rings distinctly marked by a white line and by a continuous belt of pores. Pores small, enclosed in patches of softer texture which frequently join, forming short interrupted concentric bands. Medullary rays fine, numerous, almost equidistant.

North West Himalaya and eastern skirts of the Suliman Range ascending to 8,000 feet.
Growth slow, 20 rings per inch of radius. Weight 56 lbs. per cubic foot. The twigs are used for basket work and often form part of the twig bridges of the North West Himalaya.

		lbs.
H 2895.	Fagu, Simla, 8,000 feet.	
H 2870.	Nagkanda, Simla, 8,000 feet.	...
H 2935.	Mahasu, Simla, 7,000 feet.	56

2. **I. atropurpurea**, Ham.; Brandis 136; Hook. Fl. Ind. ii. 101; Roxb. Fl. Ind. iii. 381. Vern. *Bankati, kala sakena, sakna*, Hind.; *Khenti, jand*, Kaghan; *Kathi, gorkatri*, Kashmir.

A shrub of smaller size, but with wood of structure similar to that of *I. heterantha*.

to Nepal, ascer

A moderate-sized deciduous tree, under certain circumstances gregarious. Bark ½ inch thick, light brown, sometimes with bluish patches, with regular longitudinal and horizontal cracks. Sapwood small; heartwood mottled, light brown, sometimes reddish brown, hard, close-grained; annual rings indistinct. Pores moderate-sized, enclosed in irregularly-shaped, more or less concentric but interrupted patches and bands of white soft tissue. These patches, which are tapering and pointed at the ends, are separated by irregularly-shaped belts of firm and darker-coloured shining tissue, in which the fine and numerous, white, uniform and equidistant medullary rays are distinctly visible. Pores marked on a longitudinal section.

Chiefly in the intermediate zone. Sub-Himalayan tract from the Sutlej to the Tista, ascending to 5,000 feet; Central India and the Western Coast.

Weight, 57 to 60 lbs. (*Brandis*); R. Thompson gives 58; our specimens give an average of 55 lbs. The wood is tough and durable, and takes a beautiful polish. It is used for agricultural implements, carriage poles, wheels and furniture; also for building. The tree gives an astringent red gum; the bark is pounded and used to intoxicate fish; and the branches are lopped for cattle fodder. A crystalline substance, probably magnesia, is sometimes found in the wood (see specimen E 601).

		lbs.
P 102.	Sutlej Valley, Punjab	...
O 212.	Garhwal (1868)	52
C 185.	Mandla, Central Provinces (1870)	53
C 1152.	Ahiri Reserve, Central Provinces	54
C 2767.	Melghát, Berar	55
C 1212.	Gumsúr, Madras	52
E 601.	Lohagarhi, Darjeeling Terai	67
W 1226.	North Kanara	53

6. DESMODIUM, Desv.

Contains a number of shrubs found in the forests in almost all parts of India. *D. pulchellum*, Bth.; Hook. Fl. Ind. ii. 162; Brandis 145; Kurz i. 383; Gamble 26 (*Hedysarum pulchellum*, Roxb. Fl. Ind. iii 361) Vern, *Juta-salpani*, Beng.; *Set krishnapani*, Cuttack; *Toungtamin*, Burm., is a common erect shrub with the flowers in the axils of bifoliolate bracts. *D. gyroides*, DC.; Hook. Fl. Ind. ii. 175; Kurz i. 388; Gamble 27. Vern. *Bolú*, Nep., is an erect, blue-flowered shrub of the Himalayas, Eastern Bengal and Burma; and *D. gyrans*, DC.; Hook. Fl. Ind. ii. 174; Brandis 146; Gamble 27 (*Hedysarum gyrans*, Roxb. Fl. Ind. iii. 351) Vern. *Gorachand*, Beng., is common in India and Burma, and generally known as the "Telegraph Plant" from its small, sensitive, rotating, lateral leaflets.

1. D. tiliæfolium, G. Don.; Hook. Fl. Ind. ii. 168; Brandis 145. Vern. *Sambar, shamru, chamra, chamyár, chamkat, chamkúl, martan, motha, gurshagal, prí, marára, múss, múrt, laber*, Hind.

A large deciduous shrub, with thin, grey bark. Wood yellowish brown, with a darker centre. Pores small. Annual rings distinctly marked by a belt of small pores; in the outer part of each annual ring the pores are very small, and generally arranged in short, linear, wavy, concentric lines. Medullary rays white, fine to very fine.

Himalaya, from the Indus to Nepal, between 3,000 and 9,000 feet.

Growth slow, 14 rings per inch of radius. Weight, 53 lbs. per cubic foot. The bark is extensively used for rope-making and paper.

		lbs.
H 3184.	Dungagalli, Hazara, 8,000 feet	...
H 51.	Nagkanda, Simla, 7,000 feet	...
H 2934.	Mahasu, Simla 7,000 feet	53
H 3019.	Kotgarh, Simla, 7,000 feet (var. *argenteum*, Wall.)	...

2. D. Cephalotes, Wall.; Hook. Fl. Ind. ii. 161; Beddome lxxxvii; Kurz i. 386; Gamble 26. *Hedysarum Cephalotes* and *umbellatum*, Roxb. Fl. Ind. iii. 360. Vern. *Bodle kúrú*, Nep; *Maniphlyol*, Lepcha; *Chetenta*, Tel.

A shrub with grey bark and yellowish wood, which in structure resembles that of *D. tiliæfolium.*

Eastern Himalaya, South India and Burma

E 3281. Damah Reserve, Western Dúars.

Abrus contains 3 species, of which *A. precatorius*, Linn; Hook Fl Ind ii 175; Roxb Fl Ind iii 258, Brandis 139 Vern *Gunchi, rakti*, Hind, *Maspati*, Nep, is a wiry climber, whose seeds (*rakti*) are used as weights by jewellers; they weigh 1½ to 2 grains each.

Mucuna contai ... which the chief are *M. imbr* ... , covered with stinging hairs ... od, M *macrocarpa*, Wall, ... r of the hills of Sikkim, Kl ... *ens*, DC. The Cowhage Plant ... *ch*, Nep, which is an annual c ... velvety pod, covered with ir

7. ERYTHRINA, Linn.

... *lithosperma*, Miq. Vern *Yea kathit*, Burm and *E. holosericea*, Kurz i 367, are trees of Burma, while *E resupinata*, Roxb Fl Ind iii. 257; Brandis 141, is a herbaceous plant from a perennial root stock found in the grass lands of the Himalayan Terai.

Wood soft; no heartwood Pores large, medullary rays broad. Numerous concentric bands of soft texture, which, as a rule, have no connection with the pores.

1. E. suberosa, Roxb. Fl Ind. iii. 253; Hook. Fl. Ind. ii. 189; Beddome lxxxvii.; Brandis 140; Kurz i 369; Gamble 27. Vern. *Pangra, dauldhák, rúngra, rowanra, nasút, madára*, Hind.; *Gúlnashtar, pariára, thab*, Pb.; *Fullidha*, Nep; *Mandal*, Gáro; *Katiang*, Lepcha; *Muni, madnga*, Tam; *Mulu modugu*, Tel.; *Phangera*, Gondi; *Gada phassa*, Kurku.

A moderate-sized deciduous tree. Outer bark corky, light grey, with deep, irregular, vertical cracks, varying in thickness up to 1 inch; inner bark fibrous, ⅛ inch thick. Wood very soft, spongy, white, fibrous but tough; that near the centre of darker colour, but no regular heartwood. Annual rings visible. Pores very large, scanty, often subdivided. Medullary rays short, broad; the tissue between the rays consisting of narrow, hard, wavy and often interrupted, concentric bands of a darker colour, separated by alternate bands of white, spongy tissue. The t ... a vertical section.

Himalaya from the Ravi to Bhutan, ascending to 3,000 feet. Oudh, Central and South India, Burma.

Growth fast, 4 rings per inch of radius. Weight, 13 to 20 lbs. per cubic foot. The wood is used for scabbards, sieve frames, and occasionally for planking. The tree is readily grown from cuttings.

		lbs.
O 530.	Dehra Dún	20
C 1145.	Ahiri Reserve, Central Provinces	...
E 668.	Bamunpokri, Darjeeling Terai	13

E. indica, Lam.; Hook. Fl. Ind. ii. 188; Beddome lxxxvii.; Brandis 139; Kurz i. 368; Roxb. Fl. Ind. iii. 249. The Indian Coral Tree. Vern. *Pangra, panjira, pangara, farad,* Hind.; *Palita mandar,* Beng.; *Muruká,* Tam.; *Modugu,* Tel.; *Pangara, phandra,* Mar.; *Háliwára, páliwára,* Kan.; *Chaldua,* Uriya; *Madar,* Cachar; *Katheik,* Magh; *Penlaykathit,* Burm.; *Dudap,* Malay; *Errabadu,* Cingh. (*Mochi* wood of Madras).

A deciduous tree. Bark yellowish, smooth and shining, peeling off in thin papery flakes, young stems and branchlets armed with prickles. Structure the same as that of *E. suberosa.*

Cultivated throughout India and Burma; wild in Oudh, Bengal, South India and Burma.

Weight, 17 to 26 lbs. per cubic foot according to our specimens, but 18 lbs. is nearest the true weight. Wood rather durable, though it is so light and open-grained it does not warp or split, and it varnishes well. It is used for light boxes, toys, scabbards, trays, and is often grown as a support for and to give shade to the betel pepper vine. It grows readily from cuttings and is used for hedges. It gives a dark-brown gum of no value.

		lbs.
C 820.	Bairagarh Reserve, Berar	17
B 2343.	Myanoung, Burma	18
B 2223.	Andaman Islands (1866)	26

3. E. arborescens, Roxb. Fl. Ind. iii. 256; Brandis 140; Gamble 27. Vern. *Rungara,* Kumaun; *Rodinga, fullidha,* Nep.; *Gyesa,* Lepcha; *Dingsong,* Khasia.

The wood has a similar structure to that of *E. suberosa* and *Indica,* but it is more compact, less spongy, and has more numerous concentric bands of soft texture.

Outer Himalaya from the Ganges to Bhutan, up to 7,000 feet; Khasia Hills.

It is very handsome when covered with its bright scarlet flowers; it grows easily from cuttings, and is often planted for ornament, as in the avenues at Darjeeling.

F 3106. Darjeeling, 7,000 feet.

E 2344 (16 lbs. per cubic foot) from Bamunpokri, Darjeeling Terai, has been identified as *E. stricta,* Roxb.; Beddome t. 175; Kurz i. 369; Gamble 27. Vern. *Mouricou, kichige,* Kan.; *Toung kathit,* Burm., described from Western India and Burma. The structure is the same as that of *E. suberosa.*

Spatholobus Roxburghii, Bth.; Brandis 143; Gamble 27. (*Butea parviflora,* Roxb. Fl. Ind. iii. 248; Kurz i. 365) Vern. *Mala, mula, maula,* Hindi.; *Debrelara,* Nep.; *Terolrik,* Lepcha; *Pouknway,* Burm., is a very common gigantic creeper of the forests of the Sub-Himalayan tract from the Jumna eastwards, Bengal and Burma, with trifoliolate leaves, white flowers and a soft porous wood in concentric layers separated by a ring of soft tissue exuding a red gum resembling "kino" (E 480, Darjeeling; O 2927, Garhwal, 1874).

8. BUTEA, Roxb.

1. B. frondosa, Roxb. Fl. Ind. iii. 244; Hook. Fl. Ind. ii. 194; Beddome t. 176; Brandis 142; Kurz i. 364; Gamble 27. Vern. *Dhák, palás, kakria, kankrei, Chichra*, Hind.; *chalcha*, Bandelkhand; *Chiúla, puroha*, C. P.; *Palás*, Beng.; *Palási, bulyettra*, Nep.; *Lahokúng*, Lepcha; *Porásu*, Uriya; *Murr*, Gondi; *Pharsa*, Kurku; *Porasan*, Tam.; *Modugu, mohtu*, Tel.; *Muttuga, thorás*, Kan.; *Parás*, Mar.; *Gasskeala, caluheale*, Cingh.; *Pouk*, Burm.

A moderate-sized deciduous tree. Bark ¼ inch thick, fibrous, grey, exfoliating in small irregular pieces; exuding from cuts and fissures a red juice which hardens into a ruby-coloured gum similar to *kino*. Wood dirty white, soft, not durable; no annual rings. Pores large, scanty. Medullary rays broad and moderately broad, white; the darker tissue between the rays is broken up into oblong patches by broad concentric bands of white tissue similar in appearance to the medullary rays; the latter distinctly visible on a radial section as long, irregular bands.

Throughout India and Burma, extending in the North-West Himalaya as far as the Jhelum.

The weight is given by Kyd as 32 lbs. per cubic foot; by Adrian Mendis,

...l to make slow matches. The
...rties as that obtained from the
...ify indigo. The seeds are used
... India lac is collected on its
... for buffaloes. The tree is well
known from its handsome scarlet flowers, appearing in the hot season before the leaves; they give a yellow dye, which treated with alum is used at the Holi festival.

		lbs.
O 237.	Garhwal (1868)	...
C 1119.	Ahiri Reserve, Central Provinces	...
C 2759.	Moharli Reserve, Central Provinces	36
E 674.	Rakti Forest, Darjeeling Terai	31
E 2315.	Sivoke " " "	40

... a climbing shrub of the Andamans.
...; Brandis 141; Gamble 28. (*Hedy-*
Sidli, baddr, biles kand, billi, pona,
... with bright
... cultivated
... and for its
... a climbing
...ontains a number of shrubs found in
... *F. semialata,*
...ar.; Hook Fl.
... Lepcha, a tall
... rather broad
... like that of

9. DALBERGIA, Linn. fil.

Contains about 28 Indian species, of which one-half are trees and the other half climbing shrubs. About 8 species are found in North-West and Central India, 13 in the Eastern Himalaya, Assam and Eastern Bengal, 8 in South India, and 18 in Burma. The Genus is divided into sections as follows:—

Pod flattened, winged at the edges—
  Staminal bundle split on one side only . *Sissoa.*
  " " " two sides . . *Dalbergaria.*
Pod thickened, not winged, falcate . . . *Selenolobium* (*Drepanocarpus* Kurz).

To the section Sissoa belong the trees *D. Sissoo, latifolia, rimosa* and *cultrata* and nine climbing shrubs. To the section Dalbergaria belong the trees *D. lanceolaria, purpurea, paniculata, glomeriflora* and *hircina* and five climbing shrubs. To the section Selenolobium belong *D. spinosa* and *reniformis,* trees or erect shrubs and two climbers.

D. rimosa, Roxb. Fl. Ind. iii. 233; Hook. Fl. Ind. ii. 232; Brandis 148, Vern. *Kaogrúm,* Sylhet and *D. hircina,* Ham.; Brandis 151. Vern. *Saras, bandír, tantia, gogera,* Hind., are trees found in the Sub-Himalayan tract from the Ganges eastwards. *D. reniformis* Roxb. Fl. Ind. iii. 226; Hook. Fl. Ind. ii. 238. (*Drepanocarpus reniformis,* Kurz i. 336). Vern. *Kures,* Sylhet; *Htoukma,* Burm.; and *D. spinosa,* Roxb. Fl. Ind. iii. 233. Vern. *Yaychinya,* Burm., are small trees of the tidal forests of Burma, the latter species, according to Kurz i. 337, having: "Wood soft, beautifully silvery white, close and straight-grained. The roots powdered absorb alcohol, and a spoonful of the powder in a tumblerful of water is said to be sufficient to destroy in less than half an hour the effects of alcohol, even in cases bordering on delirium tremens." *D. glomeriflora,* Kurz, is a tree of the upper forests of the Pegu Yomas.

Among the climbers, which have mostly a hard wood, the chief are *D. volubilis,* Roxb.; Brandis 152. Vern. *Bhatia, bankhara,* Hind., found in the Sub-Himalayan tract; and *D. tamarindifolia,* Roxb.; Gamble 29. Vern. *Damar,* Nep.; *Keti,* Sylhet, of the outer Eastern Himalaya, Eastern Bengal, Burma and the Andamans. *D. monosperma,* Dalz. (*Drepanocarpus monospermus,* Kurz i. 337), is a scandent shrub of tidal forests in Upper Tenasserim. *D. Cumingii,* Bth., is a scandent shrub said by Kurz to give a dyewood, the *Kayu-lakka* of commerce. *D. congesta,* Grah.; and *D. sympathetica,* Nimmo, are climbing shrubs of the hills of South India.

D. Sissoo, latifolia and *cultrata* have a hard, dark-coloured, heavy heartwood; while *D. stipulacea, lanceolaria* and *paniculata* have white wood without heartwood. All Dalbergias, with the exception of *nigrescens* (the identification of which is doubtful), have scanty, moderate-sized pores, joined by narrow bands or lines of soft texture. Medullary rays fine, uniform and equidistant.

1. Dalbergia Sissoo, Roxb. Fl. Ind. iii. 223; Hook. Fl. Ind. ii. 231; Beddome t. 25; Brandis 149; Gamble 28. The Sissoo. Vern. *Shisham, sissu, sissai,* Hind.; *Shewa,* Pushtu; *Táli, safedar, shín, nelkar,* Pb.; *Sissái,* Oudh; *Yette,* Tam.

A large deciduous tree. Bark between $\frac{1}{3}$ and $\frac{1}{2}$ inch thick, grey, exfoliating in narrow longitudinal strips. Sapwood small, white; heartwood brown with darker longitudinal veins, close and even grained, seasons well, very hard. Annual rings not distinctly marked, alternating dark and light-coloured bands, which run into each other. Pores large and moderate-sized, uniformly distributed, joined by irregular, narrow, wavy, white, concentric bands. Medullary rays white, very fine, uniform and equidistant, numerous. Pores well defined on a longitudinal section.

Sub-Himalayan tract from the Indus to Assam, ascending to 3,000 feet. Van ... in his "List ... Trees of Mysore and Coorg," gives it as occurring ... Kanarese na..., but it is probably not indigenous in those provinces. ... ount of d... ...le regarding the rate of growth of Sissú is as yet

The annual rings in the sapwood are, as a rule, fairly distinct; those in the heartwood are generally ill-defined: in either case a lens is required to make them out. The following statement exhibits the rings counted on sections from the Changa-Manga plantation, which were cut in 1877:—

Known age.	Number of rings visible.	Average diameter of section.	Average diameter of heartwood.	Rings per inch.
		Inches.	Inches.	
5 years	4	6 75	0 75	1·2
6 „	6	3	2	1·5
7 „	6	9	3	1 3
8 „	6	12	4 5	1
9 „	9	10 75	3 2	1·7
10 „	6	11	5	1·1
Average rings per inch of average radius				1·3

...ngs counted; if we
5, 1 5, 1 3, 1·7, 1 8,
these data refer to
itions on irrigated
measurements of
of 1·55 ring per
is a much faster

rrigated land gave
to a girth of 4 feet,

Changa-Manga plantation (*Punjab Forest Report*, 1876 77, p 22).

	Age.	Average height.	Average girth.
	Years.	Ft.	Inches.
Vhankara Circle Compartments 6, 5, 8, Block I	6	35	28
Manjoki „ „ 77, to 87 & 99 to 111, Block I	4	20	9

Delhi Bela plantation (*Mr. Minniken's Report*, 1878)

			Age.	Average height.	Average girth.
Chandrawâl, Compartment	I	3 trees	7½	25 to 30	15
Kudsia, „	III		6	20	15
„ „	„		2	12	6
Jâffar Khan, „	IV	6 trees	6	...	15 5

This
and for
of 30 incl
A sp
rings on

The weight and transversa strength have been calculated by the following experiments:—

Experiment by whom conducted.	Year.	Wood whence procured.	Weight.	Number of experiments.	Size of bar used.	Value of P.
					Ft. In. In.	
Cunningham .	1854	Gwalior	48	4	2 × 1 × 1	697
Campbell . .	...	Bengal	56	1	6 × 2 × 2	923
Skinner, No. 56 .	1862	„	50	...	3 × 1½ × 1½ / 2 × 1 × 1	870
Russell . .	„	„	55·5	...	– × 1 × 1	967
Baker . . .	1829	Northern Bengal (Cossipore, 1819).	49	9	7 × 2 × 2	762
„ . . .	„	Northern Bengal (Cossipore factory).	45	6	6 × 2 × 2	734
„ . . .	„	Northern Bengal .	..	8	3 × 1½ × 1	709
„ . . .	„	„ „ .	...	13	2 × 1 × 1	606
Brandis . .	1864	Bengal . . .	49	15	6 × 2 × 2	738
„ . .	„	„	47	18	6 × 2 × 1⅓	740
„ . .	1865-66	„	46	9	6 × 2 × 2	787
„ . .	„	„	47	17	3 × 1 × 1	869
„ . .	„	„	44	11	2 × 1 × 1	854
„ . .	„	„	45	14	2 × 1 × 0¾	919
Smythies . .	1878	Northern India, various places.	48	8	......	...

The wood is very durable, seasons well and does not warp or split. It is highly esteemed for all purposes where strength and elasticity are required. Clifford says that "in strength it is only inferior to sâl, while in many other useful qualities it surpasses it, and has the advantage of being lighter. For felloes and naves of wheels and carved work of every description, for framings of carriages and similar work, it is unsurpassed by any other wood, owing to its fine seasoning and standing qualities." It is extensively used for boat-building, carts and carriages, agricultural implements, in construction and especially for furniture.

Formerly, it was more extensively used for gun-carriages than it can be at present, owing to the comparatively small supply. With regard to its durability and strength as a wood for wheels, Clifford says, "The wheels of our ordnance carriages have never failed, however arduous or lengthened the service has been on which they have been employed, of which no more striking example can be furnished than the campaign in Afghanistan, about the most trying country in the world for wheels. Some of our batteries served throughout the campaign, went to Baneean and even to the Hindoo Koosh and came back again to India without a break-down, while Royal Artillery wheels-built of the very best materials Woolwich could produce, specially for Indian service, almost fell to pieces after few months' exposure and service on the plains of India."

It has been tried and found to be good for sleepers, and Mr. McMaster in the Proceedings of the Institution of Civil Engineers, vol. xxiii. 1863, says it will be really good for that purpose.

It is much planted as an avenue tree all over India and in forest plantations in the Punjab and Bengal.

			lbs.
P	145.	Giri Valley, Punjab, 3,000 feet	44
P	884.	Multan, „	52
P	1205.	Changa-Manga plantation (9 specimens)	...
P	1347.	Peraghaib and Saila plantations, Jhelum (8 specimens) . .	...
O	205.	Garhwal (1868)	52
O	537.	Dehra Dún	...
O	1460.	Bahraich, Oudh	49
O	1486.	Kheri, „	52

			lbs
E 675	Rakti Forest Darjeeling Terai	. . .	47
E 2347	Sukna , , „	. . . .	46
E 634	Eastern Duars Assam	.	42

2 **D. latifolia**, Roxb Fl Ind iii 221, Hook Fl Ind ii 231, Beddome t 24, Brandis 148, Gamble 29 The Blackwood or Rosewood of Southern India Vern *Sitsal*, Beng, Nep, Oudh, *Shisham, sisu, kalarukh, bhotbeula, sissúi*, Mar, *Sissu*, Guz, *Sirás, sissú, sirsa, sissa*, Mandla, *Sissa*, Uriya, *Iti, eruvadi*, Tam, *Jitegi, yerugudu, jitangi*, Tel, *Biti, thodagatti*, Kan, *Bhotuk*, Bhil, *Seris*, Gondi, *Serisso*, Kurku

A deciduous tree attaining a large size in South India Bark ½ inch thick, grey, with irregular short cracks, exfoliating in thin fibrous longitudinal flakes Sapwood yellow, small, heartwood extremely hard, dark purple, with black longitudinal streaks, no distinct annual rings, but alternating concentric belts of dark and light colour, which, however, run irregularly into each other Pores moderate sized, uniformly distributed, generally joined by narrow, white, wavy interrupted, concentric lines Medullary rays light-coloured, fine, numerous, uniform and equidistant.

Oudh, Eastern Bengal Central and South India

Growth moderate when young, 5 to 9 rings per inch of radius (*Brandis*), some of

following

experiments —

Experiment by whom conducted	Year	Wood whence procured	Weight	Number of experiments	Size of bar	Value of P
					Ft In In	
Wallich No 52		India	66 5			
Puckle .	1859	Mysore	51	4	2 × 1 × 1	1 052
Maitland . .	1862	Anamalais	51		3 × 1½ × 1½	740 to 906
Skinner No 54	1863		50		Various	912
Baker	1829	Malabar	65	3	6 × 2 × 2	822
R Thompson .	1873	Central Provinces	66			
Smythies .	1879	Various provinces	50	15	..	..

Brandis says the value of P may be taken at 930

It is a valuable furniture wood and is exported to Europe from the forests of Kanara and Malabar Wood sent to London for sale in 1878 fetched £13 10s per ton It is also used for cart wheels, agricultural implements and for gun carriages It is good for carving and fancy work and is used for the handles of knives, kukris and other arms It has been used for sleepers Nine sleepers which had been down 7 to 8 years on the Mysore State Railway were found to have, when taken up, 5 good 3 still serviceabl , and 1 bad It has been grown in plantations in Malabar and Kanara

			lbs
P { 461, 467 }	Ajmere	. . .	
C 187.			46
C 2981			53
C 1116		. .	58
C 2732		.	52
C 955		. . . . .	53
C 1230		.	61
C 1303	„	.	61
E 192	Khookloong Forest, Darjeeling Terai	.	—

		lbs.
E 672.	Bamunpokri, Darjeeling Terai	50
E 2348.	" " "	60
W 1227.	North Kanara	54
W 720.	South "	55
W 855.	" "	49
D 2044.	Mysore	54
D 1072.	North Arcot	57
No. 24.	Salem Collection	62

3. **D. cultrata**, Grah.; Hook. Fl. Ind. ii. 233; Kurz i. 342. Vern. *Yendike*, Burm.

A moderate-sized tree. Bark ½ inch thick, smooth, with short transverse clefts. Wood purplish black, with darker streaks, with harder wood than, but structure similar to, that of *D. latifolia*.

Burma.

Weight, according to Benson, 83 lbs.; according to Brandis' Burma List, 1862, No. 36, 64 lbs.; our specimens give 69 and 70 lbs. Benson gives, from experiments made with bars 3′ × 1·4″ × 1·4″, P = 1003. It is used for wheels, agricultural implements, handles of dahs and spears, and especially for carvings. The sap-wood is very perishable, but the heartwood extremely durable.

		lbs.
B 2521.	Burma (1862)	70
B 2728.	Nawing Forests, Prome (1858)	69
B 2697.	Tavoy (Wallich, 1828)	...

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4. Specimens marked *Thitpoke* (B2523), collected in Burma in 1862 (Brandis' Burma List, 862, No. 133), have light yellow wood with numerous concentric bands, scanty, large and moderate-sized pores, and very fine, very numerous, uniform and equidistant medullary rays. *Thitpoke* is identified by Kurz as *Dalbergia purpurea*, Wall., Hook. Fl. Ind. ii. 235; Kurz i. 344; which has a small heartwood. To this also belongs B 2230 from the Andaman Islands.

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5. **D. lanceolaria**, Linn.; Hook. Fl. Ind. ii. 235; Brandis 151; Gamble 29. *D. frondosa*, Roxb. Fl. Ind. iii. 226; Beddome lxxxviii. Vern. *Takoli, bithúa*, Hind.; *Bander siris*, Nep.; *Barbat, parbati*, Banswarra; *Gengri*, Panch Mehals; *Harráni*, Dharwar; *Nal valanga*, Tam.; *Pedda sopara, yerra patsaru, pasarganni*, Tel.; *Dandous, kaurchi*, Mar.

A deciduous tree. Bark ¼ inch thick, compact, grey, smooth, exfoliating in thin rounded patches. Wood white, moderately hard, not durable, no heartwood. Annual rings (?) marked by thin, concentric lines. Pores scanty, large and moderate-sized, larger and somewhat more numerous in the spring wood; often oval and subdivided, very prominent on a longitudinal section. Medullary rays extremely fine, very numerous, very regularly distributed, joined by very fine, short, white bars.

Sub-Himalayan tract from the Jumna eastwards, ascending to 2,500 feet, Central and South India.

Skinner, No. 53, gives for the weight 62 lbs. per cubic foot; Wallich 46 lbs.; our specimens give only 33 to 44 lbs. Skinner also gives P = 1003, but it is probable that he has not described the right wood, for, although he gives the correct Telugu name, yet he calls his specimens (No. 53, p. 75) *Moukshow*, Burm., and "Moulmein lance-wood;" while Kurz, the latest authority, does not give *D. lanceolaria* as occurring in Burma. Skinner says that one log was brought from the western coast, and another by Conductor Bowman from Burma. Beddome says the timber is useful for building purposes.

		lbs
C 1144	Ahiri Reserve, Central Provinces	...
E 618	Champasari Forest, Darjeeling Terai	33
E 2346	Bamunpokri, Darjeeling Terai	44

6. **D. paniculata,** Roxb. Fl. Ind. iii. 227; Hook. Fl. Ind. ii. 236; Beddome lxxxviii.; Brandis 150; Kurz i. 345. Vern. *Katsirsa*, Oudh; *Dhobein, dhohein, pássi, satpuria*, Hind; *Patchalai, valange*, Tam.; *Potrum, porilla, patsuru, toper*, Tel.; *Sondarra, sheodur, topia*, Mar.; *Hasur guniri, pachári*, Kan.; *Pianguni*, Mal.; *Tapoukben*, Burm.; *Padri*, Gondi, Bhíl, *Phassi*, Kurku.

A large deciduous tree. Bark ½ inch thick, compact, grey, smooth, with occasional horizontal cracks. Wood yellowish or greyish white, soft, perishable, no heartwood. Structure most remarkable, entirely different from that of other species of the genus: broad concentric masses of wood alternate with narrow, dark coloured belts of a fibrous substance, resembling the inner bark. Planks cut out of old trees fall to pieces. Pores small, scanty. Medullary rays very fine, numerous. Wavy, narrow, concentric bands of white tissue alternate with broader bands of harder and darker substance.

North-West Himalaya from the Jumna to Oudh, Central and South India. (Quoted by Kurz from Burma, but identification doubtful.)

[illegible]

purposes.

		lbs
C 1115	Ahiri Reserve, Central Provinces	[illegible]
C 2928.	Seoni, Central Provinces	45

7. **D. nigrescens,** Kurz i. 346. Vern. *Thitsanweng*, Burm.

A moderate-sized deciduous tree. Wood light grey, soft. Pores scanty, large, subdivided. Medullary rays very fine, very numerous.

Dry mixed forests of Upper Burma

			lbs
B 291	Burma	(1867)	[illegible]
B 2522	„	(1862)	[illegible]

There is some doubt about the identification of this species, [illegible] concentric bands.

8. **D. stipulacea,** Roxb. Fl. Ind iii. 233; Hook. [illegible] Kurz i. 346, Gamble 29. Vern. *Talebiri*, Nep.; [illegible] *Tón-nyok*, Lepcha.

A large climbing shrub. Wood soft, [illegible] brown heartwood, porous. Pores numerous, [illegible] extremely large, in white, undulating, [illegible] other. Medullary rays white, fine, very numerous.

Eastern Himalaya, ascending to 4,000 feet [illegible] Burma.

Weight, 48 lbs per cubic foot. [illegible]

		lbs
E 571.	Khookloong Forest, Darjeeling Terai	[illegible]
E 2319.	Sivoke „	[illegible]

9. **D. foliacea,** Wall; Hook. Fl. Ind. ii. [illegible] 29. Vern. *Talebiri*, Nep.

A large straggling shrub, with white porous wood with a small dark heartwood, in structure ressmbling that of *D. stipulacea*, except that the medullary rays are broader.

Eastern Himalaya and Burma.
E 3274. Múraghát Reserve, W. Dúars.

10. PTEROCARPUS, Linn.

Contains 4 Indian species. *P. macrocarpus*, Kurz i. 349; Hook. Fl. Ind. ii. 239, is a deciduous tree of the Eng and upper mixed forests of Martaban and Tenasserim, rare in Prome. The "Rosewood" or "Lancewood" of West Africa is produced by *P. erinaceus*, Poir.

The wood of the three species examined is very uniform in structure, though the colours differ. They all have extremely fine, uniform and equidistant medullary rays, large and small pores, and fine, wavy, concentric bands.

1. P. indicus, Willd.; Hook. Fl. Ind. ii. 238; Beddome t. 23; Kurz i. 349. *P. dalbergioides*, Roxb. Fl. Ind. iii. 236. Andaman Redwood. Vern. *Padouk*, Burm.; *Chalanga-dá*, And.

A lofty tree, sometimes evergreen, with grey bark. Sapwood small; heartwood dark red, close-grained, moderately hard to hard, with a slight aromatic scent. Pores scanty, small to large, sometimes oval and subdivided. Very fine, white, wavy, interrupted, concentric lines, irregularly distributed. Medullary rays extremely fine, very numerous, uniform and equidistant. The transverse diameter of the pores much larger than the distance between the rays.

Burma and the Andaman Islands.

The weights of our specimens from Burma differ considerably from those from the Andamans, the latter being much lighter, the wood softer and the colour rather lighter. The weight and transverse strength have been determined from the following experiments:—

Experiment by whom made.	Year.	Wood whence procured.	Weight.	Number of experiments.	Size of bar.	Value of P.
					Ft. in. in.	
Simpson	...	Tenasserim	62	...	3 × 1½ × 1½	781
"	...	"	81	...	3 × 1½ × 1½	1,575
Benson	...	"	71	...	3 × 1·4 × 1·4	1,033
Skinner, No. 110	1862	Burma	56	...	Various	864
Maitland	"	"	57	...	3 × 1½ × 1½	620 to 1,122
Brandis, No. 39	"	"	60	...	......	......
Smythies	1878	"	60	3	......	......
"	"	Andamans	48	4	......	......
Bennett, No. 1	1872	"	49·5	...	......	827

Used for furniture, carts, gun-carriages and other purposes. It is said to be the most useful wood in the Andamans, where it grows to an enormous size. Major Protheroe describes a tree felled in 1876 with a clear stem of 65 feet and a girth of 17 feet, and says that the wood of the root is closer-grained, darker-coloured and more beautifully marked than that of the stem. The plank sent to the Paris Exhibition of 1878 measured nearly 4 feet across. In London, a portion of the same log from which the plank was cut fetched a price of £17-10*s*. per ton, or nearly Rs. 4 per cubic foot, while three logs lately sold in Calcutta fetched Rs. 60 per ton. Furniture made from Padouk wood and exhibited at Paris in 1878 by Messrs. Jackson and Graham was much admired. They reported on it as follows:—

"This is a straight-grown wood, with rather a coarse open grain, but without any strong figure or markings. When first cut it is of a reddish brown colour, but it fades

to much the same colour as teak—a wood it resembles very much, and it is about as

"kin[illegible] 7 mature trees
per a[illegible] de available for
export

			lbs
B 581	Martaban	. . . .	60
B 2524	Pegu (1862)	. .	60
B 2708	Tavoy (Wallich, 1828)	. .	62
B 2716	" (" ")	. . .	59
B 526	Andaman Islands	. . .	46
B 2207	" " (1866)	. . .	43
B 2494	" " (Home, 1874, No 1)	.	55

2. P. santalinus, Linn. f.; Hook. Fl. Ind. ii. 239; Roxb. Fl. Ind. iii. 234; Beddome t 22; Brandis 153. The Red Sanders Tree. Vern. *Lal chandan, rakta chandan, seyapu chandanum*, Tam., Tel.; *Honné*, Kan.

A small tree. Sapwood white; heartwood purplish black, dark-orange red when fresh cut, extremely hard, the shavings giving a blood-red orange colour. Pores moderate-sized, often subdivided, scattered Medullary rays fine, numerous, equidistant, wavy. The pores are joined by many fine, white, undulating, concentric lines at unequal distances.

South India, chiefly in Cuddapah, North Arcot and the southern portion of the Karnul district
5 inches in height and
hich is fast, but the tree
. In Captain Campbell-
mentions a tree having

mens give 76 to 77 lbs
ing purposes and for
s as a dyewood, as it
contains a red colouring principle, "santalin," which is soluble in alcohol and ether, but not in water Dissolved in alcohol, it dyes cloth a beautiful salmon-pink colour. It is used in medicine by the natives as an astringent, but does not seem to have much value.

Regarding the method of planting the "Red Sanders" Tree, the following memorandum by Mr. Yarde was published at page 98 of the Report of the Forest Conference Meeting in 1875 —

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light
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g-can
Seeds soaked for a night in cold water germinate in 20 to 25 days, while those unsoaked take from 30 to 35 After germination has taken place, the beds must be moderately watered by a picotta or other means, with small communicating or distribution channels made between the beds During the first six months particular care [illegible] qually destructive as none
at al[illegible] e best guide, as they seem
only
" [illegible] from the top weight of
have [illegible] is sufficient to straighten
the st[illegible] when the p[illegible]

nursery are about six months old, they may be safely transferred to wicker or bamboo baskets, which must be done during the rains. They must be carefully removed with pointed instruments, so that their tap-roots are not injured or broken. The wicker baskets with the plants should be placed in a shady spot and watered every second or third day, and when it is perceived that the roots have taken firm hold, and the plants quite revived, the baskets should be buried in pits 1′ × 1′ × 2″ at about five or six feet apart, and watered till the rains set in. During the time the plants are in the nursery, as a protection from the sun, I always found Peruvian cotton, planted near or around, very beneficial. Of course any shade will suit the purpose required."

		lbs.
D 2066.	Mysore	76
D 2917.	Madras (Brandis)	...
D 1075.	North Arcot (with sapwood)	66
D 3151.	Cuddapah, Madras	77

3. **P. Marsupium,** Roxb.; Fl. Ind. iii. 234; Hook. Fl. Ind. ii. 239; Beddome t. 21; Brandis 152. Vern. *Bija, bijasár, bijasál, piasal*, Hind.; *Byasa*, Uriya; *Dhorbeula, ásan*, Mar.; *Peddei*, Gondi; *Peddagi, yeanga, yeggi, yegísa, pedéga, pedéi*, Tel.; *Vengai*, Tam.; *Benga, honné*, Kan.; *Bijaira*, Bijeragogarh; *Radat bera*; Bhíl.

A large deciduous tree. Bark ⅓ inch thick, grey, with long vertical cracks, exfoliating in small pieces of irregular shape and size. Sapwood small; heartwood brown, with darker streaks, very hard, durable, yielding a red resin. Pores moderate-sized and large, often subdivided, uniformly distributed. Numerous fine, white, wavy, concentric lines at regular intervals. Medullary rays extremely fine and numerous; not visible except under a lens, uniform and equidistant, prominent on a radial section. Pores marked on a vertical section; the transverse diameter of the pores many times larger than the distance between the rays.

Central and South India, extending northwards to the Banda District of the North-Western Provinces.

The weight and transverse strength have been determined by the following experiments:—

Experiment by whom conducted.	Year.	Wood whence procured.	Weight.	No. of experiments.	Size of bar used.	Value of P.
					Ft. in. in.	
Wallich, No. 224 . .	...	Travancore . .	47	...	......	...
Puckle	1859	Mysore	56	...	......	..
"	"	"	51	...	2 × 1 × 1	821
Skinner. No. 111 . .	1862	South India . .	56	...	... ...	868
French	1861	Madras (Erode workshops).	...	3	1 × 1 × 1	511
Baker (Nos. 501 to 504) .	1829	Baggri Forest, Midnapore . .	63	4	7 × 2 × 2	687
Smythies	1878	Different places .	52	10	......	...

The wood is durable, seasons well and takes a fine polish; the heartwood is full of gum resin and stains yellow when damp. It is much used for doors and window frames, posts and beams, furniture, agricultural implements, cart and boat building. It has also been used for sleepers. Out of 25 sleepers which had been down 7 to 8 years on the Mysore State Railway, there were found, when taken up, 9 good, 11 still serviceable and 5 bad. It has also been used to a certain extent on the Holkar and Neemuch and other lines. It yields, from wounds in the bark, a red gum-resin called "kino," a valuable astringent, much used in medicine.

		lbs
C 175	Mandla, Central Provinces (1870)	47
C 1105.	Ahıri Reserve, Central Provinces	58
C 2741.	Moharlı Reserve, Central Provinces	49
C 2918	Seoni, Central Provinces	56
C 1238.	Gumsúr, Madras	56
W 742	South Kanara	48
W 752	" "	45
W 850	" "	53
D 1061	South Arcot	...
D 1086	Madura	59
No 39	Salem Collection	52

11. PONGAMIA, Vent.

1 P. glabra, Vent ; Hook. Fl Ind. ii. 240, Beddome t 177; Brandis 153, Kurz i. 335. *Galedupa indica,* Lam.; Roxb Fl Ind. iii. 239. Vern. *Karanj, papar,* Hind, *Dalkaramcha, karanja,* Beng.; *Koranjú,* Uriya; *Pongá,* Tam ; *Kanga, pungu, kaniga, ganuga,* Tel, *Garanji,* Gondi ; *Charr,* Ajmere, *Húngay, pong,* Kan ; *Thinwin,* Burm.

A moderate-sized tree, almost evergreen. Bark soft, ⅓ inch thick, greyish brown, covered with small tubercles. Wood moderately hard, white, turning yellow on exposure. Annual rings indistinct. Pores moderate sized, scanty, included in and joined by white, wavy, concentric anastomosing bands of soft tissue, which alternate with bands of darker colour and firmer texture. In the darker-coloured bands the fine, white, numerous and uniformly distributed medullary rays are distinctly visible

[illegible]

leaves are used for manure for rice-fields in Mysore The tree is easily grown from cuttings.

		lbs
P 457.	Ajmere	45
C 1183	Ahıri Reserve, Central Provinces	38
E 411	Sundarbans	13

12. DERRIS, Loureiro.

[illegible]

lola, Beng., is a large evergreen scandent shrub of the tidal forests of Bengal and Burma, whose stems are used in the Sundarbans for tying logs to boats Several other species, all climbing, occur in Burma, chiefly in tidal forests

1. D. robusta, Bth.; Hook. Fl. Ind. ii. 241; Brandis 151; Kurz i. 338. *Dalbergia Krowee,* Roxb. Fl. Ind. iii 229. Vern. *Mowkilla,* Ass ; *Bolkikará,* Gáro; *Krowee,* Sylhet; *Gnilong,* Magh.

A deciduous tree. Wood light brown, hard. Pores large and moderate-sized. Medullary rays prominent, fine, wavy, equidistant. Numerous narrow, wavy, concentric bands of soft texture frequently joining the pores.

Outer Himalaya from the Ganges eastwards, Assam, Eastern Bengal, down to Pegu.

Weight, 53 lbs. per cubic foot. Roxburgh says it grows quickly to a large size.

		lbs.
E 786.	Kamrúp, Assam	53

Dalhousiea bracteata, Wall.; Hook. Fl. Ind. ii. 248; Wight Ic. t. 265, is a shrub of the Khasia Hills and Eastern Bengal. *Calpurnia aurea*, Lam.; Hook. Fl. Ind. ii. 251; Beddome lxxxix., is a handsome shrub of the hills of South India. *Euchrista Horsfieldii*, Bennett; Hook. Fl. Ind. ii. 248, is an erect shrub of the Khasia Hills.

SUB-ORDER II. CÆSALPINIEÆ.

Contains 17 genera, divided into 5 tribes, *viz.*,—

Tribe I.—Eucæsalpinieæ	*Peltophorum, Mezoneurum, Cæsalpinia, Pterolobium, Acrocarpus, Wagatea, Poinciana* and *Parkinsonia*.
„ II.—Cassieæ	*Cassia*.
„ III.—Bauhinieæ	*Bauhinia*.
„ IV.—Amherstieæ	*Amherstia, Humboldtia, Afzelia, Tamarindus* and *Saraca*.
„ V.—Cynometreæ	*Hardwickia* and *Cynometra*.

Mezoneurum and *Pterolobium* contain only climbing shrubs. The former has three species: *M. cucullatum*, W. and A.; Brandis 155; Kurz i. 409; Gamble 30. (*Cæsalpinia cucullata*, Roxb. Fl. Ind. ii. 358) Vern. *Biskoprah*, Oudh; *Sungray*, Nep.; *Runggong, yangkup*, Lepcha; *Ragi*, Bombay; *Kyoungchet*, Burm., a large climber whose stems and branches are armed with strong hooked prickles with a corky base, with porous wood, and found in the Sub-Himalayan tract from the Sarda eastwards, Western Ghâts and Burma (E. 488, Darjeeling Terai); *M. enneaphyllum*, W. and A.; Hook. Fl. Ind. ii. 258, a climber of Cachar, Chittagong and Burma; and *M. glabrum*, Desf., a large climber of Pegu. The latter has one species, *Pterolobium indicum*, A. Rich.; Hook. Fl. Ind. ii. 259 (*P. macropterum*, Kurz i. 410. *Cæsalpinia lacerans*, Roxb. Fl. Ind. ii. 367) Vern. *Walekadúda*, Tel.; *Kyoungyet-nway*, Burm., a prickly climber of Burma. The remaining genera contain chiefly trees.

Peltophorum ferrugineum, Bth.; Hook. Fl. Ind. ii. 257; Kurz i. 408, is an evergreen tree of the coast forests of the Andamans, said by Kurz to have a blackish heartwood. *Poinciana* contains one indigenous tree, *P. elata*, Linn.; Hook. Fl. Ind. ii. 260; Roxb. Fl. Ind. ii. 355; Beddome t. 178; Brandis 157; Vern. *Padenarayan*, Tam.; *Sunkeswar*, Tel.; *Nirangi*, Kan., found in the forests of South India, but more often seen planted. Skinner, No. 106, says it has wood of a yellow colour, tolerably close and even grained, easily worked, and giving a smooth surface, warping slightly, but not subject to crack, well suited for cabinet work; and that its weight is 45 lbs. per cubic foot, and $P = 516$. It also contains *P. regia*, Bojer, the well-known ornamental tree with crimson and orange flowers appearing in the hot season. It was introduced from Madagascar, and is now found planted almost all over India. Kurz says the wood is white, soft, light and loose-grained, and that the tree gives a plentiful gum. *Parkinsonia aculeata*, Linn. Hook. Fl. Ind. ii. 260; Beddome xci.; Brandis 158; Kurz i. 403, is an introduced shrub or small tree, now almost naturalised in India, especially in the arid zone, where it is grown as a hedge plant. The wood is whitish, light and soft, but close-grained and

polishes fairly Skinner, No 102, gives W=40, P=565 *Wagatea spicata*, Dalz ; of the Western Ghâts *Amherstia nobilis*, Vern *Thawka, soka*, Burm, perhaps the rld, was discovered by Mr Crawford and ey, it is now cultivated in gardens round ropagated by layers *Humboldtia* contains

Altogether, there is scarcely any class of trees with such a variety of species with handsome flowers and generally, at the same time, valuable wood as the sub order Cæsalpinieæ Besides the Indian genera there are numerous others of value such as

the Punjab

13. CÆSALPINIA, Linn.

Contains 10 shrubs, chiefly climbing and prickly. *C Bonducella*, Roxb Fl Ind. ii 357, Hook. Fl Ind. ii 254 Brandis 156, Gamble 30 The Fever Nut Vern *Katkaranj*, Hind , *Nata*, Beng , *Gajkai*, Kan, is a common very prickly climbing shrub of India, often used for hedges Its seeds are used in medicine, and contain an oil; they are tonic and antiperiodic *C sepiaria*, Roxb Fl Ind ii 360; Hook Fl Ind ii 256, Brandis 156, Kurz i 406 The Mysore Thorn Vern *Urn, uri, arlu, relu, kando, aila*, Hind , *Chillar*, Mar., *Hotsigé*, Kan, is a large prickly climber used for hedges *C pulcherri*

No 32)

1. C. Sappan, Linn.; Hook. Fl. Ind. ii. 255; Roxb. Fl. Ind. ii. 357; Beddome xc.; Brandis 156; Kurz i. 405. Vern. *Bakam*, Hind, Guz., Beng.; *Patunga*, Tam ; *Bakamu, bakapu*, Tel.; *Bokmo*, Uriya; *Pattang*, Mar.; *Patanga*, Kan.; *Teing nyet*, Burm.

A small thorny tree. Sapwood white, heartwood red. Pores isolated, enclosed in narrow rings. Medullary rays fine; the distance between the rays equal to, or somewhat larger than, the transverse diameter of the pores.

South India, Bengal and Burma

Weight, according to Skinner No 33, 60 lbs. per cubic foot, Wallich gives 61 lbs. Skinner gives P=1510 I The wood takes a fine polish and does not warp or crack, it yields a valuable dye, which is largely exported. It has been grown in plantations at Nilambûr and in the Central Provinces.

		lbs
C 3136	Mobarh, Central Provinces (cultivated) (sapwood) . . .	52

14. ACROCARPUS, Wight.

A genus placed by Baker in Flora Indica, Vol ii, under *Mimoseæ*, but by Bentham and Hooker in the Genera Plantarum as here described

1. A. fraxinifolius, Wight; Hook. Fl. Ind. ii. 292; Beddome t. 44; Brandis 158; Kurz i. 410; Gamble 30. Vern. *Mandania*, Nep.; *Madling*, Lepcha; *Mallay kone*, Tinnevelly; *Kilingi*, B *ll* *lelanji, haruluge*, Kan.

A lofty deciduous tree, with thin, light-grey bark. Sapwood white; heartwood light red, moderately hard. Pores moderate-sized to very large, often oval and divided into two to five compartments, either *isolated or enclosed in narrow interrupted bands of softer tissue prominent on a vertical section.* Medullary rays fine and moderately broad.

Hills of the Eastern Himalaya down to Chittagong, ascending to 4,000 feet; South India, and Burma.

Weight, 39 lbs. per cubic foot. The wood is used by planters in Darjeeling for tea-boxes and planking, in the Wynaad for building and furniture, and in Coorg for shingles. It is an extremely handsome tree, growing with a fine tall cylindrical stem, handsome flowers and large bipinnate leaves, which are red when young; it reproduces easily and is fast growing. Beddome mentions a tree 27 feet in girth above the buttresses, and Manson states that a windfall tree in the Lower Darjeeling Hills had a bole 70 feet without a branch and measured 11 feet in girth at the small end.

		lbs.
E 667.	Lama Gumba Forest, Darjeeling	39
D 1085.	Madura, Madras	39

15. CASSIA, Linn.

A large genus containing 18 species of herbs, shrubs and large trees. It is of considerable importance, as the trees produce fine timber and some of the shrubs and herbs the "Senna" leaves used in medicine. *C. auriculata,* Linn.; Hook. Fl. Ind. ii. 263; Brandis 165, Vern. *Tarwar, awal,* Hind.; *Tarota,* Berar; *Tangedu, tangar,* Tel.; *Avarike,* Kan., is a shrub of Central and South India; its bark is used for tanning and dyeing leather, and its seeds as an application for ophthalmia, as are those of *C. Absus,* Linn. *C. obovata,* Colladon, is a shrub common all over India, and is one of the plants furnishing the medicinal senna leaves. *C. alata,* Linn., is an introduced shrub, now run wild, whose leaves are an excellent application for ring-worm.

C. glauca, Lam.; Hook. Fl. Ind. ii. 265; Beddome xci.; Kurz i. 394, (*Senna arborescens,* Roxb. Fl. Ind. ii. 345) is a large shrub or small tree of the eastern part of South India and of Burma. *C. nodosa,* Ham.; Kurz i. 392. Vern. *Gnoothein,* Burm., and *C. renigera,* Wall. Vern. *Gnooshay,* Burm., are large trees of Burma, the former extending to the Eastern Himalaya.

Heartwood hard, heavy, dark-coloured. Pores moderate-sized and large, in patches of soft texture, which in some species are confluent and form continuous concentric bands.

1. C. Fistula, Linn.; Hook. Fl. Ind. ii. 261; Roxb. Fl. Ind. ii. 333; Beddome xci.; Brandis 194; Kurz i. 391; Gamble 30. *Cathartocarpus Fistula,* Pers. The Indian Laburnum. Vern. *Amaltás,* Hind.; *Alash, ali, karangal, kiár, kaniár,* Pb.; *Raj briksh, kitola,* Kumaun; *Chimkani,* Sind.; *Gurmala,* Guz.; *Sundali, bandarlati,* Beng.; *Sandari,* Uriya; *Kitwáli, kitoli, itola, shimarra, sím,* North-Western Provinces; *Warga,* Oudh; *Jaggarwah, raila, hirojah, karkacha,* C. P.; *Jaggra, kambar, rera,* Gondi; *Banag, bangru,* Kurku; *Bahawah, baya, bawa,* Mar.; *Raj birij,* Nep.; *Sonalu,* Gáro; *Bonurlati, bonurlauri, persar,* Palamow; *Sunaru,* Assam; *Bandolat,* Cachar; *Kone, sirikone,* Tam.; *Reylu, rela, suvarnam, konay,* Tel.; *Kaki,* Tam.; *Kakke,* Kan. *Ahalla,* Cingh.; *Gnooshway, gnoogyee,* Burm.

A moderate-sized deciduous tree. Bark $\frac{1}{4}$ inch thick, compact, greenish grey and smooth when young, dark-reddish brown and rough when old, exfoliating in many-sided patches. Sapwood large, heartwood varying in colour from grey or yellowish red to brick-red, very hard to extremely hard. Sharp, thin, white, concentric lines which may possibly be annual rings. Pores moderate-sized, uniformly distributed,

enclosed in, and joined by, white, wavy, irregul n and often interrupted concentric bands of soft tissue Medullary rays very fine, very numerous, uniform and equidistant, slightly bent, prominent in the dark, firm tissue which separates the wavy bands

Sub-Himalayan tract, ascending to 4 000 feet, and throughout India and Burma Growth moderate, 9 rings per inch of radius

The weight and transverse strength have been determined by the following experiments —

Experiment by whom made	Years	Wood whence produced	Weight	Number of experiments	Size of bar	Value of P
					Ft In In	
Kyd		Assam	56		2 × 1 × 1	698
Skinner No 43	1862	South India	61			846
R Thompson	1868	Central Provinces	62			
Brandis Nos 33 and 34	1862	Burma	57 66			
Central Provinces List	1873	Central Provinces	66			
Smythies	1878	Different Provinces	60	11		

The wood is very durable, but rarely of sufficiently large size for timber It makes

two feet long It is often cultivated for ornament

			lbs
P	101	Sutlej Valley, Punjab 3 000 feet	...
P	437	Ajmere	
P	439		61
O	244	Garhwal (1868)	52
O	333	Gorakhpur (1868)	52
C	1154	Ahiri Reserve Central Provinces	56
E	579	Lohagarh Forest Darjeeling Terai	62
F	2352	Bamunpokri, Darjeeling Terai	62
F	783	Kamrup Assam	60
W	861	South Kanara	62
D	2052	Mysore	58
D	1076	North Arcot, Madras	73
B	2525	Burma (1862)	66

The difference between the wood of this tree and that of *Ougeinia dalbergioides* consists in this, that in the former the patches of white soft belts, whereas in *Ougeinia* they are rhomform interrupted belts

l Ind ii 338, Hook Fl Ind ii 262 t 180 Vern. *Urimidi, uskiamen*, Tel , *Ngoomee*, Burm , *Ratoo-waa*, Cingh

A small deciduous tree, with deeply cracked, brown bark Heartwood light brown, very hard Pores moderate-sized and large, joined by narrow, undulating, irregular, white bands of soft tissue Medullary rays fine and very numerous, uniform and equidistant, prominent in the

A lofty deciduous tree, with thin, light-grey bark. Sapwood white; heartwood light red, moderately hard. Pores moderate-sized to very large, often oval and divided into two to five compartments, either isolated or enclosed in narrow interrupted bands of softer tissue prominent on a vertical section. Medullary rays fine and moderately broad.

Hills of the Eastern Himalaya down to Chittagong, ascending to 4,000 feet; South India, and Burma.

Weight, 39 lbs. per cubic foot. The wood is used by planters in Darjeeling for tea-boxes and planking, in the Wynaad for building and furniture, and in Coorg for shingles. It is an extremely handsome tree, growing with a fine tall cylindrical stem, handsome flowers and large bipinnate leaves, which are red when young; it reproduces easily and is fast growing. Beddome mentions a tree 27 feet in girth above the buttresses, and Manson states that a windfall tree in the Lower Darjeeling Hills had a bole 70 feet without a branch and measured 11 feet in girth at the small end.

		lbs.
E 667.	Lama Gumba Forest, Darjeeling	39
D 1085.	Madura, Madras	39

15. CASSIA, Linn.

A large genus containing 18 species of herbs, shrubs and large trees. It is of considerable importance, as the trees produce fine timber and some of the shrubs and herbs the "Senna" leaves used in medicine. *C. auriculata*, Linn.; Hook. Fl. Ind. ii. 263; Brandis 165, Vern. *Tarwar*, *awal*, Hind.; *Tarota*, Berar; *Tangedu*, *tangar*, Tel.; *Avarike*, Kan., is a shrub of Central and South India; its bark is used for tanning and dyeing leather, and its seeds as an application for ophthalmia, as are those of *C. Absus*, Linn. *C. obovata*, Colladon, is a shrub common all over India, and is one of the plants furnishing the medicinal senna leaves. *C. alata*, Linn., is an introduced shrub, now run wild, whose leaves are an excellent application for ring-worm.

C. glauca, Lam.; Hook. Fl. Ind. ii. 265; Beddome xci.; Kurz i. 394, (*Senna arborescens*, Roxb. Fl. Ind. ii. 345) is a large shrub or small tree of the eastern part of South India and of Burma. *C. nodosa*, Ham.; Kurz i. 392. Vern. *Gnoothein*, Burm., and *C. renigera*, Wall. Vern. *Gnooshay*, Burm., are large trees of Burma, the former extending to the Eastern Himalaya.

Heartwood hard, heavy, dark-coloured. Pores moderate-sized and large, in patches of soft texture, which in some species are confluent and form continuous concentric bands.

1. C. Fistula, Linn.; Hook. Fl. Ind. ii. 261; Roxb. Fl. Ind. ii. 333; Beddome xci.; Brandis 194; Kurz i. 391; Gamble 30. *Cathartocarpus Fistula*, Pers. The Indian Laburnum. Vern. *Amaltás*, Hind.; *Alash*, *ali*, *karangal*, *kiár*, *kaniár*, Pb.; *Raj briksh*, *kitola*, Kumaun; *Chimkani*, Sind.; *Gurmala*, Guz.; *Sundali*, *bandarlati*, Beng.; *Sandari*, Uriya; *Kitwáli*, *kitoli*, *itola*, *shimarra*, *sím*, North-Western Provinces; *Warga*, Oudh; *Jaggarwah*, *raila*, *hirojah*, *karkacha*, C. P.; *Jaggra*, *kambar*, *rera*, Gondi; *Banag*, *bangru*, Kurku; *Bahawah*, *baya*, *bawa*, Mar.; *Raj birij*, Nep.; *Sonalu*, Gâro; *Bonurlati*, *bonurlauri*, *persar*, Palamow; *Sunaru*, Assam; *Bandolat*, Cachar; *Kone*, *sirikone*, Tam.; *Reylu*, *rela*, *suvarnam*, *konay*, Tel.; *Kaki*, Tam.; *Kakke*, Kan. *Ahalla*, Cingh.; *Gnooshway*, *gnoogyee*, Burm.

A moderate-sized deciduous tree. Bark $\frac{1}{4}$ inch thick, compact, greenish grey and smooth when young, dark-reddish brown and rough when old, exfoliating in many-sided patches. Sapwood large, heartwood varying in colour from grey or yellowish red to brick-red, very hard to extremely hard. Sharp, thin, white, concentric lines which may possibly be annual rings. Pores moderate-sized, uniformly distributed,

enclosed in, and joined by, white, wavy, irregular and often interrupted concentric bands of soft tissue Medullary rays very fine, very numerous, uniform and equidistant, slightly bent, prominent in the dark, firm tissue which separates the wavy bands.

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E	579	Lohagarh Forest, Darjeeling Terai	62
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2. C. marginata, Roxb. Fl Ind ii 338, Hook Fl Ind ii 262 *C Roxburghii*, DC, Beddome t 180 Vern *Urumdi, ushiamen*, Tel, *Ngoomee*, Burm., *Ratoo-waa*, Cingh.

A small deciduous tree, with deeply cracked, brown bark Heartwood light brown, very hard Pores moderate-sized and large, joined by narrow, undulating, irregular, white bands of soft tissue Medullary rays fine and very numerous, uniform and equidistant, prominent in the

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		lbs.
E 667.	Lama Gumba Forest, Darjeeling	39
D 1085.	Madura, Madras	39

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Heartwood hard, heavy, dark-coloured. Pores moderate-sized and large, in patches of soft texture, which in some species are confluent and form continuous concentric bands.

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enclosed in, and joined by, white, wavy, irregular and often interrupted concentric bands of soft tissue Medullary rays very fine, very numerous, uniform and equidistant, slightly bent, prominent in the dark, firm tissue which separates the wavy bands

Sub-Himalayan tract ascending to 4 000 feet and throughout India and Burma Growth moderate 9 rings per inch of radius

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Experiment by whom made	Years	Wood whence produced	Weight	Number of experiments	Size of bar	Value of P
					Ft In In	
Kyd		Assam	56		2 × 1 × 1	593
Skinner No 43	1862	South India	61			846
R Thompson	1868	Central Provinces	5*			
Brandis, Nos 33 and 34	1862	Burma	{ 57 66			
Central Provinces List	1873	Central Provinces	66			
Smythies	1878	Different Provinces	60	11		

The wood is very durable but rarely of sufficiently large size for timber It makes

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		lbs
P 101	Sutlej Valley Punjab 3 000 feet	—
P 437	Ajmere	
P 439		61
O 244	Garhwal (1868)	52
O 333	Gorakhpur (1868)	52
C 1151	Ahiri Reserve Central Provinces	56
F 570	Lohagarhi Forest, Darjeeling Terai	62
F 2352	Bamunpokri Darjeeling Terai	62
F 783	Kamrup Assam	60
W 864	South Kanara	62
D 2052	Mysore	58
D 1076	North Arcot, Madras	73
B 2525	Burma (1862)	66

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2 **C marginata,** Roxb Fl Ind ii 338, Hook Fl Ind ii 262 *C Roxburghii*, DC , Beddome t 180 Vern *Urimidi, uskiamen*, Tel , *Ngoomee*, Burm , *Ratoo waa*, Cingh

A small deciduous tree, with deeply cracked, brown bark Heartwood light brown, very hard Pores moderate sized and large, joined by narrow, undulating, irregular, white bands of soft tissue Medullary rays fine and very numerous, uniform and equidistant, prominent in the

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		lbs.
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Smythies	1878	Different Provinces	60	11		

The wood is very durable but rarely of sufficiently large size for timber It makes excellent posts and is good for carts agricultural implements and rice pounders The pulp of the pods is a strong purgative the bark is used in dyeing and tanning and the gum as an astr
bright yellow fl
two feet long I

		lbs
P 101	Sutlej Valley, Punjab 3 000 feet	—
P 437	Ajmere	
P 439		61
O 244	Garhwal (1868)	52
O 343	Gorakhpur (1868)	52
C 1154	Ahiri Reserve Central Provinces	56
F 579	Lohagarhi Forest Darjeeling Terai	62
F 2352	Bamunpokri Darjeeling Terai	62
F 783	Kamrup Assam	60
W 864	South Kanara	62
D 2052	Mysore	58
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E 579	Lohagarh Forest Darjeeling Terai	62
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D 1085.	Madura, Madras	39

15. CASSIA, Linn.

A large genus containing 18 species of herbs, shrubs and large trees. It is of considerable importance, as the trees produce fine timber and some of the shrubs and herbs the "Senna" leaves used in medicine. *C. auriculata*, Linn.; Hook. Fl. Ind. ii. 263; Brandis 165, Vern. *Turwar, awal*, Hind.; *Tarota*, Berar; *Tangedu, tangar*, Tel.; *Avarike*, Kan., is a shrub of Central and South India; its bark is used for tanning and dyeing leather, and its seeds as an application for ophthalmia, as are those of *C. Absus*, Linn. *C. obovata*, Colladon, is a shrub common all over India, and is one of the plants furnishing the medicinal senna leaves. *C. alata*, Linn., is an introduced shrub, now run wild, whose leaves are an excellent application for ring-worm.

C. glauca, Lam.; Hook. Fl. Ind. ii. 265; Beddome xci.; Kurz i. 394, (*Senna arborescens*, Roxb. Fl. Ind. ii. 345) is a large shrub or small tree of the eastern part of South India and of Burma. *C. nodosa*, Ham.; Kurz i. 392. Vern. *Gnoothein*, Burm., and *C. renigera*, Wall. Vern. *Gnooshay*, Burm., are large trees of Burma, the former extending to the Eastern Himalaya.

Heartwood hard, heavy, dark-coloured. Pores moderate-sized and large, in patches of soft texture, which in some species are confluent and form continuous concentric bands.

1. C. Fistula, Linn.; Hook. Fl. Ind. ii. 261; Roxb. Fl. Ind. ii. 333; Beddome xci.; Brandis 194; Kurz i. 391; Gamble 30. *Cathartocarpus Fistula*, Pers. The Indian Laburnum. Vern. *Amaltás*, Hind.; *Alash, ali, karangal, kiár, kaniár*, Pb.; *Raj briksh, kitola*, Kumaun; *Chimkani*, Sind.; *Gurmala*, Guz.; *Sundali, bandarlati*, Beng.; *Sandari*, Uriya; *Kitwáli, kitoli, itola, shimarra, sím*, North-Western Provinces; *Warga*, Oudh; *Jaggarwah, raila, hirojah, karkacha*, C. P.; *Jaggra, kambar, rera*, Gondi; *Banag, bangru*, Kurku; *Bahawah, baya, bawa*, Mar.; *Raj birij*, Nep.; *Sonalu*, Gáro; *Bonurlati, bonurlauri, persar*, Palamow; *Sunaru*, Assam; *Bandolat*, Cachar; *Kone, sirikone*, Tam.; *Reylu, rela, suvarnam, konay*, Tel.; *Kaki*, Tam.; *Kakke*, Kan. *Ahalla*, Cingh.; *Gnooshway, gnoogyee*, Burm.

A moderate-sized deciduous tree. Bark ¼ inch thick, compact, greenish grey and smooth when young, dark-reddish brown and rough when old, exfoliating in many-sided patches. Sapwood large, heartwood varying in colour from grey or yellowish red to brick-red, very hard to extremely hard. Sharp, thin, white, concentric lines which may possibly be annual rings. Pores moderate-sized, uniformly distributed,

enclosed in, and joined by, white, wavy, irregular and often interrupted concentric bands of soft tissue Medullary rays very fine, very numerous, uniform and equidistant, slightly bent, prominent in the dark, firm tissue which separates the wavy bands

1 ... to 4 000 feet and throughout India and Burma

been determined by the following

experiments —

Experiment by whom made	Years	Wood whence produced	Weight	Number of experiments	Size of bar	Value of P
					Ft In In	
Kyd		Assam	56		2 × 1 × 1	588
Skinner No 43	186?	South India	61			846
R. Thompson	1868	Central Provinces	5?			
Brandis Nos 33 and 34	186?	Burma	{ 57 66			
Central Provinces List	1873	Central Provinces	66			
Smythies	1878	Different Provinces	60	11		

		lbs
P 101	Sutlej Valley Punjab 3 000 feet	
P 437	Ajmere	
P 439		61
O 244	Garhwal (1868)	52
O 343	Gorakhpur (1868)	52
C 1154	Ahiri Reserve Central Provinces	56
F 573	Lohagarh Forest Darjeeling Terai	62
F 2352	Bamunpokri Darjeeling Terai	62
F 783	Kamrup Assam	60
W 861	South Kanara	62
D 2052	Mysore	58
D 1076	North Arcot, Madras	73
B 2525	Burma (186?)	66

The difference between the wood of this tree and that of *Ougeinia dalbergioides* consists in this that in the former the patches of white soft ... *Ougeinia* they are rhomb- ... belts

... Hool Fl Ind ii 262

C Roxburghii, DC, Beddome t 180 Vern *Urimidi, uskiamen*, Tel, *Agoomee*, Burm, *Ratoo waa*, Cingh

A small deciduous tree, with deeply cracked, brown bark Heartwood light brown, very hard Pores moderate sized and large, joined by narrow, undulating, irregular, white bands of soft tissue Medullary rays fine and very numerous, uniform and equidistant prominent in the

dark firm tissue which separates the bands of white soft tissue. Structure similar to that of *C. Fistula*.

Madras, Ceylon and Burma (Thoungyeen forests).
Weight, Skinner, No. 44, gives 63 lbs.; our specimen gives 59 lbs. per cubic foot. Skinner gives P = 880. The wood is well adapted for turning, naves of wheels and handles of tools.

		lbs.
B 301.	Burma (1862)	59

3. C. siamea, Lamk.; Hook. Fl. Ind. ii. 264.; Kurz i. 392. *C. florida*, Vahl; Beddome t. 179. *Senna sumatrana*, Roxb. Fl. Ind. ii. 347. Vern. *Beati, manje konne*, Tam.; *Sime tangadi*, Kan.; *Waa*, Cingh.; *Maizalee*, Burm.

A moderate-sized tree with smooth bark. Sapwood whitish, rather large. Heartwood dark brown, nearly black, very hard. Pores large and moderate-sized, joined by concentric, light-coloured, wavy bands of soft tissue which alternate with black belts of firm texture, in which the fine, light-coloured, uniform and equidistant medullary rays are prominent. Frequently beautifully mottled on a vertical section.

South India, Burma and Ceylon.
Weight, according to Skinner, No. 39, 58 lbs.; our specimens give 54·5. P = 840. Very durable. Used in Burma for mallets, helves and walking-sticks; in South India it is little known, but it is considered one of the best kinds of fuel for locomotives in Ceylon (*Beddome*).

		lbs.
D 1080.	North Arcot	58
B 2526.	Burma (1862)	54
B 2712.	Tavoy (Wallich, 1828)	52

4. C. timoriensis, DC.; Hook. Fl. Ind. ii. 265; Beddome xcii.; Kurz i. 393. Vern. *Arremene*, Cingh.; *Toung maizalee*, Burm.

A handsome, small, evergreen tree. Wood dark brown, nearly black. Structure resembling that of *C. siamea*.

Burma and Ceylon.
Weight, 57 lbs., P = 594, according to Adrian Mendis. Used in Ceylon for building and furniture.

		lbs.
No. 4.	Ceylon Collection	57

B 2260, 45 lbs., and B 2295, 46 lbs., sent by Major Ford from the Andamans in 1866 under the name of *Gnoogyee*, belong to a species of *Cassia*. Wood hard, durable, olive brown, with a structure similar to that of *Ougeinia dalbergioides*. It is evidently a common wood in the Andamans.

16. BAUHINIA, Linn.

Contains about 20 to 30 species, almost equally divided into trees and climbers. Few of the species reach a very large size, but their commonness renders them important. They are easily recognised by their two leaflets being generally joined together for a portion of their length, forming apparently a bilobed, palmately veined leaf.

Tree section. *B. acuminata*, Linn.; Hook. Fl. Ind. ii. 276; Roxb. Fl. Ind. ii. 324; Brandis 159; Kurz i. 396. Vern. *Kanchan*, Beng.; *Kachnar*, Hind.; *Mahahlayka phyoo*, Burm., is an erect, white-flowered, handsome shrub of South India and Burma. *B. tomentosa*, Linn.; Hook. Fl. Ind. ii. 275; Roxb. Fl. Ind. ii. 323; Beddome xcii.; Brandis 159. Vern. *Kachnar*, Hind.; *Kanchini*, Tam., Tel., is a shrub or small tree of South India with showy, yellow flowers, having a purple eye, and

a tough wood with nearly black heartwood *B triandra*, Roxb. Fl Ind ii 320 is a ... Kurz Vern *Swaitan* Burm

Burma

found in our forests *B*

Brandis 161, Kurz i 401,

in Northern and Central India and in Tenasserim Its uses are almost more numerous than those of any other forest plant except the bamboo Its large flat leaves are sewn

in alternate bends and often with a straight ...)

Wood red or brown, hard, no heartwood, concentric bands of soft tissue alternating with bands of finer texture, in which the numerous fine, uniform and equidistant medullary rays are distinctly visible The pores are uniform in size

1 **B malabarica**, Roxb Fl Ind ii 321, Hook Fl Ind ii 277, Beddome xcii, Brandis 159, Kurz i 399, Gamble 31 Vern *Amli, amlosa*, Hind, *Karmai*, Beng, *Amli tali*, Nep, *Kattra*, Ass, *Cheppura, Basavana pada*, Kan, *Amli*, Mar, *Kundapula, dhondel, kangali*, Gondi, *Ambotha, chapa*, Kurku, *Palla dondur, puli shinta, pulhari*, Tel, *Apta*, Berar, *Bwayygyin*, Burm

A moderate sized deciduous tree Bark ½ inch thick, rough, brown, exfoliating in linear flakes Wood light-reddish brown, with irregular masses of black or purplish wood near the centre, moderately hard Pores moderate sized, generally oval and subdivided Numerous narrow, wavy, white, concentric bands of softer tissue alternate with bands of harder and red coloured wood of equal width, in which the numerous, fine, uniform and equidistant medullary rays are distinctly visible

Sub-Himalayan tract from the Ganges to Assam Bengal Burma South India

Weight the average of our specimens gives 48 lbs, Brandis 1862 Burma List No 31, 42 lbs The wood is rarely used The tree is recognised by its acid leaves which are eaten

			lbs
C	1137	Ahiri Reserve Central Provinces	
C	2817	Melghat Berar (sapwood)	41
C	821	Borngarh Reserve Berar	47
E	590	Khookloong Forest Darjeeling Terai	51
E	2360	Bamunpokri Darjeeling Terai	48
B	3203	Burma (1862)	

2 **B racemosa**, Lam, Hook Fl Ind ii 276, Beddome t 182, Brandis 159, Kurz i 397 *B parviflora*, Vahl, Roxb Fl Ind ii 323 Vern *Kosundra, taur*, Pb, *Kachnal, gurial, thaur, ashta, malkāna, mauli, dhorari*, Hind, *Dhondri, dhun lera, astra, boska*, Gondi; *Jhinjri*,

Ajmere; *Ari*, *arro*, Tel.; *Ati*, *archi*, *areka*, Tam.; *Apta*, *seyára*, Mar.; *Banraj*, Beng.; *Ambhota*, Uriya; *Aupta*, Kan.; *Hpalan*, Burm.; *Amba bhósa*, Bhíl; *Bossai*, Kurku.

A small deciduous tree. Bark ¼ inch thick, dark brown, very rough, with numerous, deep, vertical cracks. Wood light brown, hard, with irregularly-shaped masses of darker-coloured and harder wood near the centre. Pores moderate-sized, often in radial lines. Narrow, white, irregular bands of softer tissue alternate with darker bands of somewhat greater width, in which the very numerous, fine, uniform and equidistant medullary rays are distinctly visible.

Sub-Himalayan tract from the Ravi eastwards, ascending to 5,000 feet; Oudh, Bengal, Burma, Central and South India.

Weight, Brandis' Burma List, 1862, No. 32, gives 44 lbs.; R. Thompson, 56 lbs.; our specimens give 50 lbs. on an average. The wood is good, but not used. The fibres of the bark are used to make ropes and slow matches.

			lbs.
P	453.	Ajmere	...
P	3216.	Nagpahar, Ajmere	...
O	247.	Garhwal (1868)	53
O	335.	Gorakhpur (1868)	47
C	200.	Mandla, Central Provinces (1869)	56
C	1170.	Ahiri Reserve, Central Provinces	44
C	2770.	Melghát, Berar (sapwood)	41

3. B. purpurea, Linn.; Hook. Fl. Ind. ii. 284; Roxb. Fl. Ind. ii. 320; Beddome xcii.; Brandis 160; Kurz i. 398; Gamble 31. Vern. *Koiral*, *karár*, *karalli*, *gray*, Pb.; *Koliár*, *kaniár*, *kandan*, *khairwal*, *kwillar*, *koilari*, *sona*, Hind.; *Khwairalo*, Nep.; *Kachik*, Lepcha; *Deva kanchan*, *rakta kancha*, *koiral*, Beng.; *Kodwari*, Gondi; *Koliari*, Kurku; *Atmatti*, Mar.; *Kanchan*, Tel.; *Pedda aré*, *mandareh*, Tam.; *Sarúl*, *kanchiváda*, Kan.; *Mahalay kani*, Burm.

A moderate-sized deciduous tree. Bark ⅓ to ½ inch thick, ash-coloured to dark brown. Wood pinkish white, turning dark brown on exposure, moderately hard. Pores moderate-sized, mostly oval, subdivided. Wavy, concentric bands of soft tissue alternating with darker-coloured bands of firmer tissue, in which the white, fine, uniform and equidistant medullary rays are distinctly visible.

Sub-Himalayan tract from the Indus eastward, Central and South India and Burma.

Weight, according to Skinner, No. 24, 39 lbs.; our specimens give an average of 49 lbs. Wood used for agricultural implements and in construction. The bark is used for tanning, the leaves for cattle fodder, and the flower buds are pickled and eaten.

			lbs.
P	153.	Sainj, Giri Valley, 3,000 feet	42
O	229.	Garhwal (1868)	55
O	230.	„ „	46
C	822.	Bairagarh Reserve, Berar	50
C	2792.	Melghát, Berar (sapwood)	36
E	585.	Khooklong Forest, Darjeeling Terai	50

4. B. variegata, Linn.; Hook. Fl. Ind. 284; Roxb. Fl. Ind. ii. 319; Beddome xcii.; Brandis 160; Kurz i. 397; Gamble 31. Vern. *Kachnar*, *koliár*, *kurál*, *padrián*, *khwairal*, *guriál*, *gwiar*, *bariál*, Hind.; *Taki*, Nep.; *Rha*, Lepcha; *Rakta kanchan*, Beng.; *Borara*, Uriya; *Segapu-munthari*, Tam.; *Kanchivala-do*, Kan.; *Bwaycheng*, Burm.

A moderate sized deciduous tree Bark grey, with vertical cracks Wood grey, moderately hard, with irregular masses of darker and harder wood in the centre Pores moderate sized, enclosed in round or elongated and pointed concentric patches of white soft tissue, which often run into each other The intervening tissue is firm and dark coloured, with very numerous, fine, uniform and equidistant white medullary rays Distinct white, concentric lines, which probably are annual rings Medullary rays distinctly visible on a radial section, giving the wood a handsome mottled appearance

Sub Himalayan tract from the Indus eastwards and throughout the forests of India and Burma Often planted for ornament

Weight according to R Thompson 54 lbs our specimen gives 42 lbs Used for agricultural implements The bark is used for dyeing and tanning and the leaves and flower buds eaten The flowers are very handsome somewhat like those of some of the *Azaleas* but having four white and one crimson petal

		lbs
P 1200	Madhopur Punjab	33
C 823	Bairagarh Reserve Berar	48
E 591	Khooklong Forest Darjeeling Terai	47
E 2351	Bamunpokri ,	39

5 **B retusa,** Ham , Hook Fl Ind ii 279, Roxb Fl Ind ii 322, Beddome xciii , Brandis 161 Vern *Kural*, Pb , *Kandla, kanalla, kuayral, gwayral, kanlao, semla*, Hind , *Nirpa* Gondi, Tel , *Tewar*, Palamow

A moderate sized deciduous tree Bark ¼ inch thick, dark brown, with a few vertical cracks Wood reddish white, with irregularly shaped, darker masses near the centre, hard Pores moderate sized and large, scanty, occasionally grouped Numerous narrow, white, concentric bands of softer tissue, alternating with harder and darker bands of equal width in which the white, fine, uniform equidistant and very numerous medullary rays are prominent

North West Himalaya from the Beas eastwards, ascending to 4,500 feet, Central India

Weight 58 lbs per cubic foot Wood not used It gives a clear gum called Semla Gum almost exactly resembling gum arabic it is largely collected and exported from the Dehra Dun Of this gum Capt Campbell says —

The collection of the Semla gum commences in January and is continued throughout February and March It sells in Dehra at Re 1 8 Rs 2 or Rs 2 8 per maund according to quality and is utilised as a medicine and in compound with other medicines Occasionally too it is eaten in its crude state by the very poorest natives down country It is also used to waterproof terraced roofs The annual export from the Dehra Dun is about 2 500 maunds

		lbs
O 532	Dehra Dun	58
C 1160	Ahiri Reserve Central Provinces	—

17 AFZELIA, Sm

Contains 2 trees *A retusa* Kurz is a small evergreen tree of the coast forests of the Andamans The *Maraboie* wood of Malacca is probably *A palembanica* Baker

1 **A bijuga,** A Gray , Hook Fl Ind ii 274, Kurz i 412 Vern *Shoondul, hinga*, Beng , *Pynkado*, Burm in the Andamans, *Pinydá, daagundi*, And

A moderate sized evergreen tree Bark thin, grey, peeling off in fine, papery scrolls Sapwood white, moderately hard, large in young trees, small in old trees, heartwood reddish brown, hard,

Pores moderate-sized, frequently oval and subdivided, enclosed in oval patches of soft tissue, prominent on a longitudinal section. Medullary rays fine, numerous, uniform and equidistant, wavy, visible on a radial section as long narrow bands.

Sundarbans of Bengal, Andaman Islands and the Malay Archipelago. It will probably be found on the coasts of Arracan, Pegu and Tenasserim.

Weight, young wood 36 to 42 lbs.; old wood 45 to 49 lbs. Brandis' Memorandum on Andaman woods, 1874, Nos. 12, 13, gives 50 lbs. A valuable wood, used in the Andamans for bridge and house building.

		lbs.
E 403.	Sundarbans	36
E 415.	"	42
B 315.	Burma (1867) (*Kohbeng*)	49
B 521.	Andaman Islands	45
B 2209.	" " (1866)	48

18. TAMARINDUS, Linn.

1. T. indica, Linn.; Hook. Fl. Ind. ii. 273; Roxb. Fl. Ind. iii. 215; Beddome t. 184; Brandis 163; Kurz i. 414; Gamble 32. The Tamarind. Vern. *Amli, ambli, imli,* Hind.; *Tintiri, tintil, tintúl,* Beng.; *Titri,* Nep.; *Teteli* Ass.; *Tentúli, koyam,* Uriya; *Púli,* Tam.; *Chinta,* Tel.; *Sitta, hitta,* Gondi; *Chicha,* Kurku; *Karangi, kamal, asam,* Mysore; *Hunase,* Kan.; *Amli, chitz,* Mar.; *Siyembela,* Cingh.; *Magyee,* Burm.

A large evergreen tree. Bark ½ inch thick, dark grey, with longitudinal fissures and horizontal cracks. Wood yellowish white, sometimes with red streaks, hard and close-grained. Heartwood small, near the centre of old trees only, dark purplish brown, with an irregular outline and radiating ramifications, very durable. Annual rings indistinct. Pores moderate-sized, uniformly distributed, each pore or group of pores surrounded by round patches of soft tissue, which are often confluent, forming irregular and oblique bands. Medullary rays very fine, very numerous, uniform and equidistant.

Cultivated throughout India and Burma as far north as the Jhelum.

The weight and transverse strength have been ascertained by the following experiments:—

Experiment by whom conducted.	Year.	Wood whence procured.	Weight.	No. of experiments.	Size of bar.	Value of P.
					Ft. In. In.	
Puckle	......	Mysore . .	83	4	2 × 1 × 1	792
Skinner, No. 121 . .	1862	South India .	79	......	......	864
Cunningham . .	......	Gwalior . .	60	2	2 × 1 × 1	614, sapwood.
"	......	" . .	79	2	2 × 1 × 1	815, heartwood.
Adrian Mendis, No. 79 .	1855	Ceylon . .	80	......	2 × 1 × 1	780
Smythies	1878	Mysore . .	82	1	......	heartwood,
		Other Provinces . .	62	2	.....	sapwood.

Wood highly prized, though extremely difficult to work. It is used for wheels, mallets, planes, furniture, rice-pounders, oil and sugar mills, and is an excellent wood for turning. The fruit is used in medicine as a laxative; it is made into preserves and exported to Europe. The leaves are also used in curries, and the seed, ground to powder and mixed with gum, gives a strong cement.

It is very largely planted in avenues and topes and is one of the most beautiful of Indian trees

				lbs
C 2811	Melghat Berar	sapwood		61
P 451	Ajmere	sapwood		63
E 2353	Siliguri Bengal	sapwood		63
D 2014	Mysore	heartwood		82
No 79	Ceylon Collection	heartwood		80

19 HARDWICKIA, Roxb

Contains 2 species both from Central and South India

Heartwood dark coloured, hard, heavy Pores moderate sized, filled with resin Medullary rays fine, very numerous, the distance between the rays being less than the transverse diameter of the pores

1 H binata, Roxb Fl Ind ii 423, Hook Fl Ind ii 270, Beddome t 26, Brandis 162 Vern *Anjan* Hind, Mar, *Acha, alli*, Tam, *Karyepi, yapa*, Tel, *Kamra, karachi*, Kan, *Chhota dundhera*, Gondi, *Bone* Kuil u, *Parsid*, Singrowli

A deciduous tree Bark ½ inch thick, dark grey, rough with irregular vertical cracks, exfoliates in narrow flakes Sapwood small, white, heartwood extremely hard, dark red, often with a purplish tinge, cross and very close grained Pores moderate sized often subdivided, filled with resin, uniformly distributed Medullary rays fine, numerous, undulating, and frequently bent where they touch the pores, visible on a radial section as straight, narrow, white bands Scanty, fine, concentric lines

In dry forests of South and C[illegible] garious in isolated belts or patches of [illegible]

		lbs
C 800	Punassa Reserve Central Provinces	81
C 1147	Al iri	81
C 2986	Nimar Central Provinces	83
C 2929	Palamow Bengal	82
D 1055	Sal m Madras	83
D 2025	Mysore	77
No 31	Salem Collection	82

2 H pinnata, Roxb Fl Ind ii 425, Hook Fl Ind ii 270, Beddome t 255 Vern *Kolaru*, Tinnevelly, *Matayen samprani*, Travancore, *Yenne*, Manjarabad (*VanSomeren*)

A very large tree Sapwood large, heartwood brown, moderately hard, exuding a red, sticky substance similar to copaiba balsam, which consists of different resins dissolved in an essential oil Pores mo[illegible]

sized and large, often subdivided. Medullary rays fine, nearly equidistant, bending where they touch the pores. Scanty, not very prominent, concentric lines of soft texture.

Western Gháts from South Kanara to Travancore.
Weight, 47 lbs. per cubic foot. Wood used for building by coffee planters and others. For analysis of the gum resin see Mr. Broughton's Report in Beddome Fl. Sylv. Madr. t. 255.

		lbs.
D. 1064.	Tinnevelly	47

20. CYNOMETRA, Linn.

Contains 4 Indian species. *C. cauliflora*, Linn.; Hook. Fl. Ind. ii. 268; Beddome t. 315, is an evergreen tree cultivated in Burma and South India; *C. travancorica*, Beddome t. 316; Hook. Fl. Ind. ii. 267, is a lofty tree of the hills of Travancore and Tinnevelly, between 2,000 and 4,000 feet.

Wood red, hard, heavy; no heartwood. Numerous, narrow, concentric bands similar to those of *Bauhinia*.

1. C. ramiflora, Linn.; Hook. Fl. Ind. ii. 267; Beddome t. 315; Kurz i. 415. *C. bijuga*, Spanoghe. Vern. *Shingr*, Beng.; *Irapú*, Tam.; *Myeng kabeng*, Burm.; *Gal mendora*, Cingh.

A large evergreen tree. Wood red, hard, close-grained. Pores small, uniformly distributed, often oval and subdivided. Numerous wavy bands of soft, light-coloured tissue, alternating with narrower bands of hard and firmer tissue, in which the fine and very numerous medullary rays are distinctly visible.

Sundarbans, South India and Burma in tidal forests.
Weight, 56 lbs.; P = 826, Skinner, No. 52; our specimens give 58 lbs. per cubic foot; Nos. 27, 32, of Adrian Mendis' Ceylon Collection bear the names *Gal mendora* and *Hal mendora*, weight, 56 to 58 lbs.; P = 740. Skinner says that it is used for housebuilding and carts, and that chips of the wood give in water a purple dye. It is used in the Sundarbans for posts for native huts and for fuel.

		lbs.
E 397.	Sundarbans	58

2. C. polyandra, Roxb. Fl. Ind. ii. 372; Hook. Fl. Ind. ii. 268. Vern. *Ping*, Cachar, Sylhet.

A large evergreen tree. Wood light red, hard, close-grained. Pores moderate-sized, joined by narrow concentric bands of soft tissue. Medullary rays moderately broad.

Khasia Hills, Sylhet and Cachar.
Weight, 53 lbs. according to Wallich; our specimens give 60 lbs. Mann says the wood is very useful for scantlings and makes good charcoal.

		lbs.
E 1276.	Cachar	60

21. SARACA, Linn.

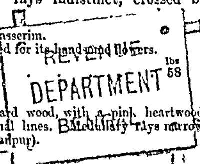
Three Indian species are given in the Flora Indica. *S. Lobbiana*, Baker; Hook. Fl. Ind. ii. 272, is a tree of Martaban; and *S. triandra*, Baker; Hook. Fl. Ind. ii. 272 (*Jonesia triandra*, Roxb. Fl. Ind. ii. 220) of Tenasserim.

1. S. indica, Linn.; Hook. Fl. Ind. ii. 271; Beddome t. 57; Brandis 166; Kurz ii. 415. *Jonesia Asoca*, Roxb. Fl. Ind. ii. 218. Vern. *Asok*, Hind.; *Asoka*, Beng.; *Áseka*, *ati*, Cuttack; *Diyera tembela*, Cingh.; *Ashunkar*, Kan.; *Jassundi*, Bombay; *Thaw-ka-hpo*, Burm.

Wood light, reddish-brown, soft. Pores moderate-sized in radial and frequently oblique lines. Medullary rays indistinct, crossed by numerous, fine, wavy, concentric lines.

Eastern Bengal, South India, Arracan and Tenasserim.
Weight, 50 lbs. per cubic foot. Often cultivated for its handsome flowers.

		lbs
No 23	Ceylon Collection	58



The Carob tree, *Ceratonia siliqua*, has a hard wood, with a pink heartwood. Pores moderately small, often in groups or radial lines. Medullary rays narrow, unequal, irregularly distributed (No. 3266. Saharanpur).

Sub Order III. MIMOSEÆ

Contains 13 Genera divided into 5 Tribes, *viz*,—

Tribe I.—Parkieæ	*Parkia.*
„ II.—Adenanthereæ	*Entada, Piptadenia, Adenanthera, Prosopis* and *Dichrostachys.*
„ III.—Eumimoseæ . . .	*Mimosa, Leucæna* and *Xylia.*
„ IV.—Acacieæ	*Acacia.*
„ V.—Ingeæ	*Calliandra, Albizzia* and *Pithecolobium.*

Parkia contains 3 species from Eastern Bengal and Burma: *P. Roxburghii,* ...

... *scandens*, Bth.; Hook. ... *rsætha*, DC., *Mimosa* ... *vedi*, Uriya; *Pangra*, ... *av.* Burm., is a large ...

... containing ... Children ... The kernels ... ermen for ...

... tree found ... Bth., and *C.* ... ls, Eastern ... *P. dulce*, ... *is*, Willd.; ... *bil*, Hind.; ... introduced ... dish brown ... it coppices ... Hook. Fl. ... Hind., is a large tree of the forests of the outer ...

Hills.

22. PIPTADENIA, Benth.

1. P. oudhensis, Brandis 168; Hook. Fl. Ind. ii. 289. *Adenanthera oudhensis*, J. L. Stewart. Vern. *Gainti*, Oudh.

A moderate-sized tree. Bark ½ inch thick, grey-brown to dusky red, rough with flattish, exfoliating woody scales; inner bark red, fibrous. Wood yellowish or reddish, close-grained, no heartwood, hard, durable. Pores moderate-sized and large, often subdivided in patches of soft tissue, which are sometimes confluent. Medullary rays short, numerous, moderately broad.

Forests at the foot of the Nepal Hills, Gonda division, Oudh, discovered by Mr. R. Thompson.

O 3084. Gonda, Oudh.

23. ADENANTHERA, Linn.

1. A. pavonina, Linn.; Hook. Fl. Ind. ii. 287; Roxb. Fl. Ind. ii. 370; Beddome t. 96; Brandis 168; Kurz i. 417. Vern. *Rakta-chandan, ranjana*, Beng.; *Ani kundamani*, Tam.; *Bandi gurivenda*, Tel.; *Manjati*, Mal.; *Thorlaganj*, Mar.; *Manjádi*, Kan. *Madateya*, Cingh.; *Gung*, Magh; *Ywaygyee*, Burm.; *Rechedá*, And.

A deciduous tree, with grey bark. Heartwood red, hard, close-grained. Pores small, scanty, in short radial lines. Medullary rays very fine, extremely numerous.

Bengal, South India, Burma and Andaman Islands.
Weight, Skinner, No. 12, gives 56 lbs., which is the same as our specimen; Bennett gives 55 lbs. Skinner gives P = 863; and Bennett 942. The wood is used in South India for house-building and cabinet-making purposes, and gives a red dye. The seeds are worn as ornaments, and [illegible] tidal tohts by goldsmiths and jewellers as they
distinctly [illegible] very constu[illegible] used as weig[illegible] specimens [illegible] give an oil.
Sundarbans, South [illegible] P = 82[illegible] ant in weight, *viz.*, 4 grains; they [illegible] lbs.
are said to [illegible] dri[illegible] 56

B 523. Andaman Islands . . . . .

24. PROSOPIS, Linn.

Contains about 18 species, dispersed over the tropical and sub-tropical regions of Asia, Africa and America. Of the five sections which compose the genus, sections whose characters are based to some extent upon the shape and structure of the fruit, three may be noticed, as they contain species which have lately been introduced into India:—

1. With the pod smooth or slightly thickened at the seeds	Adenopis . .	Contains the two Indian species; *P. spicigera*, the well-known "Jhand" and *P. Stephaniana* of the Northern Punjab plains and Western Asia.
2. With the pod smooth, thickened at the seeds so as to be almost jointed, and generally falcate	Algarobia . .	Contains two of the species now being grown, *viz.*, *P. glandulosa* of the mountains of Western Texas; and *P. pallida* of South America.
3. With the pod spirally twisted	Strombocarpa .	Contains the true "Mesquit" Bean, or *P. pubescens* of Texas and New Mexico.

P. spicigera, Linn., is here described; *P. Stephaniana*, Kunth; Hook. Fl. Ind.
ii. 288; Brandis 171. Vern. *Jembút*, Arab., is a small thorny shrub of no economic use.
P. pallida, Kunth, is a native of South America, and has been successfully
[illegible] Its pods are considered of high value as a tanning material, con-

taining, it is said, as much as 90 per cent of tannic acid They are known by the name of "Balsamocarpon"

[illegible] Algaroba of Texas," is a native of the [illegible]

it is believed, [illegible]
hard and durable timber, with a beautiful grain, and is used for [illegible]
and in the manufacture of charcoal It also affords a large quantity of gum resembling gum arabic, which exudes from the stem and branches, and has been used as mucilage in the making of jujubes, and for other purposes

P. pubescens, Bth, the "Screw Bean" or "Screw Mesquit," is a small tree of Texas, New Mexico and Arizona. Remarkable for its screw shaped pods These pods grow in abundant clusters of 8 or 10 upon the same stem, ripen at all times of the year, and contain much nutritious saccharine matter, but great caution is required in their use as fodder for horses

Another species, a native of Jamaica, and possibly not distinct from *P glandulosa*, is the *P juliflora*, DC, of the section Algarobia Its fruits have poisonous properties, though, for other purposes, the tree appears to be useful for planting in some localities, as the plants when once established go on sending up shoot after shoot, and are difficult to eradicate

1. P. spicigera, Linn.; Hook. Fl. Ind. ii 288; Beddome t. 56; Brandis 169. *Adenanthera aculeata*, Roxb. Fl. Ind. ii. 371. Vern. *Jhand, khár*, Pb.; *Kandi, kundi*, Sind., *Chaunkra*, Agra; *Khejra*, Rajputana; *Sangri*, Pertabgarh; *Semru, hamra*, Guz; *Shemi, saunder*, Mar.; *Shami*, Beng., Uriya; *Perumbe, vunne, jambu*, Tam.; *Chani*, Tel.

A moderate-sized, deciduous, thorny tree. Bark ¾ to 1 inch thick, grey, rough, with deep longitudinal fissures and horizontal cracks. Sapwood large, perishable, heartwood purplish brown, extremely hard. Pores very small to moderate-sized, generally imbedded in narrow irregular concentric bands of soft tissue, filled with resin. Medullary rays short, extremely numerous, fine, wavy.

Arid, northern and southern dry zones. Punjab, Sindh, Rajputana, Guzerat, Bundelkhand and Dekhan

Brandis says the growth is probably slow, it having 3 feet girth in 30 years (Saharanpur), this would give about 5 years per inch of radius, which is moderately fast.

Weight, according to Skinner, No 108, 72 lbs, but the identification of his [illegible], Dalzell gives 58 lbs., and J. L. Stewart 51 lbs, our specimens [illegible] durable, liable to [illegible] oppices well [illegible] ements, but [illegible] dis gives the [illegible] s wood were [illegible], the pressure [illegible] rabica wood 1,388 lbs., and of *Tamarix gallica* wood [illegible] ie same test

It is largely used for fuel for locomotives and steamers in the Punjab and Sind, and [illegible] The pods are used as fodder for camels, [illegible] ubstance is eaten, raw or cooked, in parts of [illegible] has the flavour of that of the Carob tree. It has an [illegible] specimen of which pieces were sent to the Paris Ex[illegible]
64 feet. [illegible]

P	882	Multán	[illegible]
P	939	„ (rootwood)	[illegible]
P	1380	Karokpo Forest, Hyderabad, Sind	79
P	159	Ajmere (young tree)	57

25. DICHROSTACHYS, DC.

1. D. cinerea, W. and A.; Hook. Fl. Ind. ii. 288; Beddome t. 185; Brandis 171. *Mimosa cinerea,* Roxb. Fl. Ind. ii. 561. Vern. *Vurtuli,* Hind.; *Kunlai, kunrat, kheri,* Mhairwarra; *Vadatalla, vadatara,* Tam.; *Velturu, yeltu,* Tel.; *Segum kati,* Mar., Gondi; *Andara,* Cingh.

A thorny shrub or small tree. Heartwood red, extremely hard. Pores moderate-sized, enclosed in rings of soft texture. Medullary rays short, moderately broad, equidistant, the distance between the rays equal to the transverse diameter of the pores.

Dry, stony hills in South and Central India, Rajputana.
Weight, 75 lbs. per cubic foot. Wood used for walking-sticks.

			lbs.
No.	25.	Salem Collection.	79
No.	3.	Ceylon Collection (marked *Vachellia farnesiana*) . .	71
P	3239.	Ajmere	...
P	3229.	Nagpahar, Ajmere	...

26. MIMOSA, Linn.

M. pudica, Linn.; Hook. Fl. Ind. ii. 291. The Sensitive Plant. Vern. *Lajwánti* Kumaun; *Lajuk,* Beng., is now naturalised over the greater part of tropical and subtropical India, where it grows to be a small shrub, and is with difficulty eradicated. *M. hamata,* Willd.; Hook. Fl. Ind. ii. 291, is a prickly shrub of South India.

1. M. rubicaulis, Linn.; Hook. Fl. Ind. ii. 291; Brandis 172; Gamble 32. *M. mutabilis,* Roxb. Fl. Ind. ii. 564. Vern. *Rál, khair, didriár,* Pb.; *Hajeru,* Sind; *Agla, agl, kingli, kacheyta,* Hind.; *Aradi,* Nep.; *Sibriú,* Lepcha; *Chilatti,* Bhíl.

A large, straggling, prickly shrub with grey bark. Sapwood yellowish white; heartwood red, hard. Pores small and moderate-sized, frequently oval and subdivided. Medullary rays fine and very numerous.

Throughout the greater part of India, ascending to 4,000 feet in Kumaun and Sikkim.
Weight, 41 to 52 lbs. Used for gunpowder charcoal.

			lbs.
E	680.	Bamunpokri, Darjeeling Terai	41
E	2354.	Chunbati, Darjeeling, 2,000 feet	52

27. XYLIA, Bth.

1. X. dolabriformis, Benth.; Hook. Fl. Ind. ii. 286; Beddome, t. 186; Brandis 171; Kurz i. 419. *Mimosa xylocarpa,* Roxb. Fl. Ind. ii. 543. *Inga xylocarpa,* DC. The Ironwood Tree of Pegu and Arracan. Vern. *Jambu,* Hind.; *Jamba, suria,* Mar.; *Boja,* Uriya; *Irúl,* Tam.; *Konda tangedu, tangedu, eruvalu, bojeh,* Tel.; *Jambé, tirawa,* Kan.; *Shilve,* Coorg; *Pynkado,* Burm.

A large deciduous tree. Bark ¼ inch thick, grey or reddish brown, with short cracks irregularly distributed. Sapwood small; heartwood dark brown or reddish brown, extremely hard, beautifully mottled, cross-grained, the fibres on a longitudinal section being wavy. Annual rings indistinct, but alternate concentric bands of darker and lighter colour. Pores small and moderate-sized, often subdivided into numerous compartments, and then oval or oblong. Pores or groups of pores in irregular patches of whitish tissue, which are often arranged in zig-zag lines. These patches are separated by hard, dark-coloured tissue in which the

very fine and very numerous medullary rays are distinctly visible. Some of the specimens of this wood have an oily touch.

Chanda District, South India, Arracan and Burma

The weight and transverse strength have been determined by the following experiments —

Experiment by whom conducted	Year	Wood whence procured	Weight	No of experiments	Size of bar	Value of P
					Ft in in	
Puckle	1859	Mysore	58		2 × 1 × 1	693
List of woods	1863	„	58			
Brandis, No 37	1862	Burma	60-66			
Commissariat Department		Moulmein	63			1153
Skinner, No 83	1862	South India	58			836
Benson		Burma	63		3 × 1½ × 1½	1191
Laslett	1875	„	73 5	6	7 × 2 × 2	945
Smythies	1878	Chanda	59	1		
	„	Kanara	61	4		
	„	Burma	65	3		

The wood is very durable—a property it doubtless owes in great measure to the resinous substance contained in it This resin is more abundant in Burmese wood ... Wallich ... side, and ... o in hot ... Burma; also for carts and tool handles In South India it is used for railway sleepers, posts, boat-building and carts. In Burma and Bengal it has been largely used for telegraph posts, for which it has answered well The large forests in Arracan, of which Dr Schlich in his report on the ironwood forests of Arracan, dated 1st September 1869, says that "a third of the forest vegetation consists of Pynkado,' produce large numbers of telegraph poles and railway sleepers Major Seaton in his report for 1876 77 said that 10,000 such sleepers from Arracan had then lately been sold at Calcutta at Rs 6 each, and Mr Ribbentrop's Report states ...

		lbs
C 1161	Ahiri Reserve, Central Provinces	59
W 751	South Kanara	59
W 761.	„ „	61
W 857.	„ „	61
W 1222	North Kanara	62
B 805.	Tharrawaddi, Burma	67
B 3068	Burma (1862)	66
B 1151	Tavoy (Wallich, 1828)	62

28. ACACIA, Willd.

Contains about 18 Indian species, of which four are climbing or straggling thorny shrubs, and the rest trees or erect shrubs *A Latronum*, Willd, Hook Fl Ind ii 296, Bedd Fl Ind xcv, Brandis 180 (*Mimosa Latronum*, Roxb Fl Ind ii 559) Vern *Bhes* Hind *Paki tuma* Tel is a gregarious very thorny shrub of the

25. DICHROSTACHYS, DC.

1. **D. cinerea,** W. and A.; Hook. Fl. Ind. ii. 288; Beddome t. 185; Brandis 171. *Mimosa cinerea,* Roxb. Fl. Ind. ii. 561. Vern. *Vurtuli,* Hind.; *Kunlai, kunrat, kheri,* Mhairwarra; *Vadatalla, vadatara,* Tam.; *Veltura, veltu,* Tel.; *Segum kati,* Mar., Gondi; *Andara,* Cingh.

A thorny shrub or small tree. Heartwood red, extremely hard. Pores moderate-sized, enclosed in rings of soft texture. Medullary rays short, moderately broad, equidistant, the distance between the rays equal to the transverse diameter of the pores.

Dry, stony hills in South and Central India, Rajputana.
Weight, 75 lbs. per cubic foot. Wood used for walking-sticks.

			lbs.
No.	25.	Salem Collection	79
No.	3.	Ceylon Collection (marked *Vachellia farnesiana*) . .	71
P	3239.	Ajmere	...
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1. **M. rubicaulis,** Linn.; Hook. Fl. Ind. ii. 291; Brandis 172; Gamble 32. *M. mutabilis,* Roxb. Fl. Ind. ii. 564. Vern. *Rál, khair, didriár,* Pb.; *Hajeru,* Sind; *Agla, agl, kingli, kacheyta,* Hind.; *Aradi,* Nep.; *Sibriú,* Lepcha; *Chilatti,* Bhíl.

A large, straggling, prickly shrub with grey bark. Sapwood yellowish white; heartwood red, hard. Pores small and moderate-sized, frequently oval and subdivided. Medullary rays fine and very numerous.

Throughout the greater part of India, ascending to 4,000 feet in Kumaun and Sikkim.
Weight, 41 to 52 lbs. Used for gunpowder charcoal.

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E	680.	Bamunpokri, Darjeeling Terai	41
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1. **X. dolabriformis,** Benth.; Hook. Fl. Ind. ii. 286; Beddome, t. 186; Brandis 171; Kurz i. 419. *Mimosa xylocarpa,* Roxb. Fl. Ind. ii. 543. *Inga xylocarpa,* DC. The Ironwood Tree of Pegu and Arracan. Vern. *Jambu,* Hind.; *Jamba, suria,* Mar.; *Boja,* Uriya; *Irúl,* Tam.; *Konda tangedu, tangedu, eruvalu, bojeh,* Tel.; *Jambé, tirawa,* Kan.; *Shilve,* Coorg; *Pynkado,* Burm.

A large deciduous tree. Bark $\frac{1}{4}$ inch thick, grey or reddish brown, with short cracks irregularly distributed. Sapwood small; heartwood dark brown or reddish brown, extremely hard, beautifully mottled, cross-grained, the fibres on a longitudinal section being wavy. Annual rings indistinct, but alternate concentric bands of darker and lighter colour. Pores small and moderate-sized, often subdivided into numerous compartments, and then oval or oblong. Pores or groups of pores in irregular patches of whitish tissue, which are often arranged in zig-zag lines. These patches are separated by hard, dark-coloured tissue in which the

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Chanda District, South India, Arracan and Burma

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Experiment by whom conducted	Year	Wood whence procured	Weight	No of experiments.	Size of bar	Value of P.
					Ft in in	
Puckle . . .	1850	Mysore . .	58		2 × 1 × 1	693
List of woods	1863	" . . .	59		. .	
Brandis, No 37 . .	1862	Burma . .	60-66			
Commissariat Department		Moulmein	63			1153
Skinner, No 83 . .	1862	South India . .	59		.	836
Benson		Burma . .	83		3 × 1½ × 1½	1191
Laslett	1875	" . . .	73 5	6	7 × 2 × 2	955
Smythies	1878	Chanda	59	1		
	"	Kanara . .	61	4	.	
	"	Burma . .	65	3		

The wood is very durable—a property it doubtless owes in great measure to the resinous substance contained in it. This resin is more abundant in Burmese wood . Wallich tside, and e in hot Burma; rs, posts, boat-building and carts. In Burma and Bengal it has been largely used for telegraph posts, for which it has answered well The large forests in Arracan, of which Dr Schlich in his report on the ironwood forests of Arracan, dated 1st September 1869, says that "a third of the forest vegetation consists of Pynkado," produce large numbers of telegraph poles and railway sleepers Major Seaton in his report for 1876 77 said that 10,000 such sleepers from Arracan had then lately been sold at Calcutta at Rs. 5 each, and Mr Ribbentrop's Report states

			lbs
C	1151.	Ahiri Reserve, Central Provinces	59
W	751	South Kanara	59
W	761.	" "	61
W	857.	" "	61
W	1222.	North Kanara	62
B	805.	Tharrawaddi, Burma	67
B	3060	Burma (1862)	66
B	1151.	Tavoy (Wallich, 1828)	62

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Weight, 41 to 52 lbs. Used for gunpowder charcoal.

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Chanda District South India Arracan and Burma
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Experiment by whom conducted	Year	Wood whence procured.	Weight	No of experiments	Size of bar	Value of P
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List of woods	1863		58			
Brandis No 37	186?	Burma	60-66			
Commissariat Department		Moulmein	83			1153
Skinner No 83	1862	South India	58			636
Benson		Burma	83		3 × 1½ × 1½	1191
Lawlett	18 5	"	73 5	6	7 × ? × ?	955
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		lbs
C 1151	Allum Reserve Central Provinces	5?
W 754	South Kanara	5?
W 7?1		?1
W 8?7		?1
W 12?2	North Kanara	62
B ?05	Tharrawaddi Burma	?7
B 306?	Burma (18 ?)	6?
B 1151	Tavoy (Wallich 1828)	62

28 ACACIA, Willd

Contains about 18 Indian species of which four are climbing or straggling thorny shrubs, and the rest trees or erect shrubs *A Latronum* Willd Hook Fl Ind ii ... Beddome ... (*Mimosa Latronum* Roxb Fl Ind ...) Vern ... Tel ... a gregarious very ...

southern dry zone. *A. Jacquemonti*, Bth.; Hook. Fl. Ind. ii. 293; Brandis 183. Vern. *Hauza*, Afg.; *Kikar, babúl, bamúl*, Pb.; *Murmutli*, Berar; *Ratabauli*, Guz., is a small, bushy, thorny shrub of the arid and northern dry zones, ascending in the Suliman Range and Hazara to 3,200 feet; it is used for fodder, and the bark of the root in the distillation of spirits. *A. Senegal*, Willd.; Hook. Fl. Ind. ii. 295 (*A. rupestris*, Stocks; Brandis 181) Vern. *Khor*, Sind; *Kúmta*, Rajputana, is a small thorny tree of the arid and northern dry zones, chiefly found in Sind and Ajmere. Brandis says, "Bark smooth, yellowish grey; wood light yellow, heavy and hard, with small irregular masses of black heartwood in the centre; it takes a beautiful polish, and is used for weavers' shuttles." It gives a gum which is collected and sold in Sind with that of *A. arabica*. *A. lenticularis*, Ham.; Hook. Fl. Ind. ii. 296; Brandis 186. Vern. *Khin*, Kumaun, is a small tree of the Siwaliks, of Kumaun and the Rajmehal hills in Bengal. *A. Suma*, Kurz; Hook. Fl. Ind. ii. 294; Brandis 187; Kurz i. 421 (*A. Catechu*, Bth.; Beddome t. 49, *Mimosa Suma*, Roxb. Fl. Ind. ii. 563.) Vern. *Saikanta*, Beng.; *Mugli*, Kan.; *Kumtia*, Pertabgarh; *Dhaula khejra*, Banswara; *Son kairi*, Dangs, is a tree of Bengal, South India, parts of the Central Provinces and Guzerat. It is recognised from *A. Catechu* by its having white bark, while that species has a black-coloured bark. It gives cutch, and the bark is used for tanning. *A. planifrons*, W. and A.; Hook. Fl. Ind. ii. 293; Beddome xcv.; Brandis 575. The Umbrella Thorn. Vern. *Salé, sal*, Tel., is a small gregarious tree of South India with a strong wood used for agricultural implements and fuel. *A. concinna*, DC.; Hook. Fl. Ind. ii. 296; Beddome xcv.; Brandis 188; Kurz i. 423; Gamble 33. (*Mimosa concinna*, Roxb. Fl. Ind. ii. 565). Vern. *Aila, rassaul*, Oudh; *Banritha*, Beng.; *Sikekai*, Dekkan; *Gogu, chikai*, Tel.; *Sigé*, Kan.; *Soopwotnway*, Burm., is an extremely thorny scandent shrub of most parts of India and Burma, except the arid zone. Its thick fleshy pods are used for washing the hair, and the acid leaves are eaten. *A. pruinescens*, Kurz i. 424, is a climber of the forests of Pegu.

The true gum arabic is the produce of *A. vera*, Willd., a tree of Egypt, Arabia and Northern Africa. "Sabicu" is the wood of *A. formosa*, a tree of the West Indies (W = 57; P = 994, Laslett).

The character of the Indian species of *Acacia* is to have sharp, prominent, medullary rays, which are short in *A. Catechu, ferruginea* and *modesta*, but long in the others; as a rule, they are not well marked on a radial section, but *A. leucophlœa* and *arabica* form an exception. The pores are, as a rule, uniform in size, but in *A. eburnea* they vary from small to large. With regard to their distribution, two series may be distinguished. In the first series the pores are isolated and enclosed in very narrow rings of softer tissue, and do not form concentric bands; to this section belong *A. arabica, modesta* and *ferruginea*. In the species of the second series, the pores are enclosed in elongated patches of softer tissue, which are frequently confluent and form distinct, though often irregular, concentric bands. This section includes *A. leucophlœa, eburnea, pennata* and *Catechu*. The Australian species have a different structure, and are all marked by short medullary rays.

1. A. Farnesiana, Willd.; Hook. Fl. Ind. ii. 293; Beddome t. 52; Brandis 180; Kurz i. 420. *Mimosa Farnesiana*, Linn.; Roxb. Fl. Ind. ii. 557. Vern. *Vilayati kikar, vilayati babúl, pissi babul, gú-kikar*, Hind.; *Gúya babula*, Beng.; *Vedda vala*, Tam.; *Kusturi, piktúmi, oda sale, murki tumma*, Tel.; *Jáli*, Kan.

A thorny shrub. Wood white, hard, close-grained. Pores moderate-sized, in oblique and concentric interrupted bands of soft texture. Medullary rays fine, numerous.

Indigenous to America, now cultivated all over India. The gum is collected in Sind. It has yellow, extremely fragrant flowers, from which a perfume is made. It makes a good fence.

Weight, 49 lbs per cubic foot

		lbs
P 3076	Sabathu, Punjab	49

2. A. arabica, Willd ; Hook. Fl. Ind. ii. 293 ; Beddome t. 47 ; Brandis 180. *Mimosa arabica*, Roxb. Fl. Ind ii. 557. Vern. *Kikar*, Pb. ; *Babbar*, Sind ; *Babúl, babúr*, Hind. ; *Karúvelum*, Tam. ; *Túma, nella túma*, Tel. ; *Gobli, karryáli*, Kan.

A moderate-sized or large tree, seldom leafless, with dark brown rough bark. Sapwood large, whitish ; heartwood pinkish white, turning reddish brown on exposure, hard, mottled with dark streaks. Pores moderate-sized, sometimes large, oval and subdivided. Medullary rays fine and moderately broad, short, numerous, unequally distributed, conspicuous on a radial section. The wood consists of darker and lighter coloured bands of an equal width.

Cultivated or self-sown throughout the greater part of India, except in the most humid tracts near the coast Wild probably in Sind, Rajputana, Guzerat, and the Northern Dekkan

Brandis says " In the Punjab it attains a girth of 2½ feet in about 12 and 5 feet in about 30 years In the forests of Lower and Middle Sind, the average growth has been ascertained to be —

At 35 years 4 feet girth, at 4 feet from the ground
" 55 " 6 " " " "

[illegible] less [illegible] dius, [illegible] the [illegible]

			Age	No of tree	[illegible] inches	[illegible] feet
Compartment 1	Chandrawál		7½	4	23 5	25 30
" 3	Kudsia		6	4	13 5	25
" 4	Jáffar Khan		6	7	17	18 to 25

Chandrawál is probably on better soil than the others, as the rate of growth is 2 rings per inch as against 2 2 and 2 8 in Nos 3 and 4 respectively.

[illegible]

It comes up well self sown, coppices well, and may be grown from cuttings It sends down a very long taproot

		lbs
P 1108	Madhopúr, Punjab	59
P 890	Multán	49
P 1379	Miani Forest, Sind	56
P 440	Ajmere	—
C 843	Amraoti, Berar	56
D 1051.	Salem, Madras	56
No 1	Salem Collection	50

3. A. eburnea, Willd. ; Hook. Fl. Ind. ii 293 ; Be[illegible] ; P[illegible] 183. *Mimosa eburnea*, Roxb. Fl. Ind. ii 558. Vern.

A short or small deciduous tree, with rough, dark-grey bark. Wood hard, yellowish white, extremely hard, splits in drying. Pores moderate-sized and large, often oval and subdivided into compartments enclosed in wavy and irregular concentric bands of softer tissue, which are frequently interrupted. Medullary rays fine and moderately broad, wavy, prominent in the bands of darker and finer tissue, which alternate with those of soft texture.

Sind, Suliman range, Berar, Dekkan and South India.
Weight, 52 lbs. per cubic foot.

		lbs.
C 844.	Amraoti Reserve, Berar	52

4. **A. leucophlœa**, Willd.; Hook. Fl. Ind. ii. 294; Beddome t. 48; Brandis 184; Kurz i. 421. *Mimosa leucophlœa*, Roxb. Fl. Ind. ii. 558. Vern. *Rerú, raunj, karír, nimbar, ringa, rinj, rohani, jhind, safed kikar*, Hind.; *Arinj*, Rajputana; *Raundra, runjra*, Banswara; *Renuja*, Bijeragogarh; *Tumma*, Gondi; *Hewar*, Mar.; *Velvaylam, vel-vaghe*, Tam.; *Tella-túma, harwar*, Tel.; *Bili jáli, topal, naibela*, Kan.; *Katu andara*, Cingh.; *Tanoung*, Burm.

A moderate-sized or large deciduous tree. Bark ½ inch thick; colour varying with age, grey and smooth when young, dark brown, almost black, and rough when old, exfoliating irregularly in patches and strips. Sapwood large; heartwood reddish brown with lighter and darker streaks, [illegible]ely hard. Pores moderate-sized, uniformly distributed in patches short irregular concentric belts of white tissue which are prominent in, and alternate with, the dark-coloured firm tissue which separates the medullary rays. The latter are white, fine and moderate, and often slightly bent.

Plains of the Punjab from Lahore to Delhi, and in all forest tracts of Central and South India and Burma.

Weight, Skinner, No. 5, gives 55 lbs.; R. Thompson, 58 lbs.; and Central Provinces List of 1873, 45 lbs.; our specimens give 50 and 59 lbs. Skinner gives P=861. It seasons well and takes a good polish; is strong and tough, but often eaten by insects. It gives an excellent fuel. The bark is eaten in times of scarcity; it is used in preparing spirits from sugar and palm juice, to precipitate by the tannin it contains the albuminous substances in the juice. It gives a fibre used for nets and coarse cordage. The young pods and seeds are eaten, and the gum is used in native medicine.

		lbs.
P 947.	Lahore	50
C 1118.	Ahiri Reserve, Central Provinces	59

5. **A. modesta**, Wall.; Hook. Fl. Ind. ii. 296; Brandis 185. *Mimosa dumosa*, Roxb. Fl. Ind. ii. 559, and probably *M. obovata*, Roxb. *l. c.* 561. Vern. *Palosa*, Afg.; *Phulahi*, Pb.

A thorny, moderate-sized, deciduous tree. Bark rough, with a multitude of narrow irregular cracks. Sapwood large, white, perishable; heartwood dark brown, with black streaks, extremely hard, harder than that of *A. Catechu*. Pores moderate-sized, sometimes joined by narrow bands of white tissue. Medullary rays fine, white, short.

Suliman and Salt Ranges, Sub-Himalayan tract between the Indus and the Sutlej, and the northern part of the Punjab plains.

Growth slow. Weight, according to J. L. Stewart, 55 lbs.; our specimens vary from 67 to 72; average 69 lbs. A most beautiful wood, strong and durable; valuable for cart-wheels, sugarcane crushers, Persian water-wheels and agricultural implements.

It gives a gum used in native medicine The leaves and fallen blossoms are collected for cattle fodder

		lbs
P 164.	Hoshiarpur (J L Stewart, 1866)	72
P 944.	Gujerat	68
P 945	Multan	67

6 **A. ferruginea**, DC ; Hook Fl Ind ii 295; Beddome t 51; Brandis 185, Kurz i 423, Gamble 32 *Mimosa ferruginea*, Roxb Fl. Ind ii 561 Vern *Khour*, Nep , *Kaiger*, Panch Mehals , *Son khair*, Berar, *Kar khair*, Gondi , *Phandra khair*, Mar. , *Teóri khair*, Bhil , *Banni*, Kan , *Velvelam*, Tam , *Ansandra, tella tuma, wúni*, Tel

A large deciduous tree Bark ½ inch thick, rough Sapwood large, heartwood olive brown, extremely hard, harder than *A Catechu* Pores moderate-sized, generally single, in small rounded patches of softer tissue, which are often confluent and joined into short interrupted concentric bands Medullary rays short, white, fine, numerous.

Northern Bengal, Central and S[illegible] imens give 70 lbs. Skinner says it is used for building, similar to gum arabic

		lbs
C 872.	Bairagarh Reserve, Berar	70
E 2357	Bamunpokri Darjeeling Terai	67
D 1081	North Arcot	73

A piece of red wood B 2529 (57 lbs) collected in Burma in 1862 and marked *Sha*, has large and moderate-sized pores filled with resin, they are often subdivided and their transverse diameter is greater than the distance between the fine closely packed and prominent medullary rays It evidently belongs to a species of Acacia and in structure resembles *A ferruginea*, which has not yet been described from Burma

7. **A. Catechu**, Willd , Hook Fl Ind ii 295 , Brandis 186 , Kurz i. 422 , Gamble 32 *A Sundra*, Beddome t 50 *Mimosa Sundra*, Roxb. Fl Ind ii 562 Vern. *Khair*, Hind , *Khoira, koir*, Ass , *Khaira*, Uriya , *Karangalli, bága*, Tam , *Sandra, nalla sandra*, Tel , *Kagli*, Kan , *Rat kihiri*, Cingh , *Sha*, Burm

A moderate-sized, gregarious, thorny, deciduous tree Bark dark grey or greyish brown, rough, exfoliating in long narrow strips Sapwood yellowish white, heartwood either dark or light red, extremely hard The wood grown in the Himalayan valleys shows the annual rings marked by a whitish line and by a larger number of pores in the spring wood. Pores moderate-sized and large, often subdivided occasionally in radial groups of 2 or 3, and surrounded by narrow rings of softer tissue which are often joined and form interrupted concentric bands Pores frequently filled with a white substance, uniformly distributed except that they are more numerous in the innermost part of each annual ring, distinctly marked on a longitudinal section Medullary rays short, moderately broad, numerous, bent where they touch the pores, which are often larger than the space between two medullary rays

Common in most parts of India and Burma [illegible]

A short or small deciduous tree, with rough, dark-grey bark. Wood hard, yellowish white, extremely hard, splits in drying. Pores moderate-sized and large, often oval and subdivided into compartments enclosed in wavy and irregular concentric bands of softer tissue, which are frequently interrupted. Medullary rays fine and moderately broad, wavy, prominent in the bands of darker and finer tissue, which alternate with those of soft texture.

Sind, Suliman range, Berar, Dekkan and South India.
Weight, 52 lbs. per cubic foot.

		lbs.
C 814.	Amraoti Reserve, Berar	52

4. **A. leucophlœa**, Willd.; Hook. Fl. Ind. ii. 294; Beddome t. 48; Brandis 184; Kurz i. 421. *Mimosa leucophlœa*, Roxb. Fl. Ind. ii. 558. Vern. *Rerú, raunj, karír, nimbar, ringa, rinj, rohani, jhind, safed kikar*, Hind.; *Arinj*, Rajputana; *Raundra, runjra*, Banswara; *Renuja*, Bijeragogarh; *Tumma*, Gondi; *Hewar*, Mar.; *Velvaylam, vel-vaghe*, Tam.; *Tella-túma, harwar*, Tel.; *Bili júli, topal, naibela*, Kan.; *Katu andara*, Cingh.; *Tanoung*, Burm.

A moderate-sized or large deciduous tree. Bark $\frac{1}{3}$ inch thick; colour varying with age, grey and smooth when young, dark brown, almost black, and rough when old, exfoliating irregularly in patches and strips. Sapwood large; heartwood reddish brown with lighter and darker streaks, extremely hard. Pores moderate-sized, uniformly distributed in patches or short irregular concentric belts of white tissue which are prominent in, and alternate with, the dark-coloured firm tissue which separates the medullary rays. The latter are white, fine and moderate, and often slightly bent.

Plains of the Punjab from Lahore to Delhi, and in all forest tracts of Central and South India and Burma.

Weight, Skinner, No. 5, gives 55 lbs.; R. Thompson, 58 lbs.; and Central Provinces List of 1873, 45 lbs.; our specimens give 50 and 59 lbs. Skinner gives P = 861. It seasons well and takes a good polish; is strong and tough, but often eaten by insects. It gives an excellent fuel. The bark is eaten in times of scarcity; it is used in preparing spirits from sugar and palm juice, to precipitate by the tannin it contains the albuminous substances in the juice. It gives a fibre used for nets and coarse cordage. The young pods and seeds are eaten, and the gum is used in native medicine.

		lbs.
P 947.	Lahore	50
C 1118.	Ahiri Reserve, Central Provinces	59

5. **A. modesta**, Wall.; Hook. Fl. Ind. ii. 296; Brandis 185. *Mimosa dumosa*, Roxb. Fl. Ind. ii. 559, and probably *M. obovata*, Roxb. *l. c.* 561. Vern. *Palosa*, Afg.; *Phulahi*, Pb.

A thorny, moderate-sized, deciduous tree. Bark rough, with a multitude of narrow irregular cracks. Sapwood large, white, perishable; heartwood dark brown, with black streaks, extremely hard, harder than that of *A. Catechu*. Pores moderate-sized, sometimes joined by narrow bands of white tissue. Medullary rays fine, white, short.

Suliman and Salt Ranges, Sub-Himalayan tract between the Indus and the Sutlej, and the northern part of the Punjab plains.

Growth slow. Weight, according to J. L. Stewart, 55 lbs.; our specimens vary from 67 to 72; average 69 lbs. A most beautiful wood, strong and durable; valuable for cart-wheels, sugarcane crushers, Persian water-wheels and agricultural implements.

It gives a gum used in native medicine The leaves and fallen blossoms are collected for cattle fodder

		lbs
P 164	Hoshiarpur (J L Stewart 1866)	72
P 944	Gujerat	68
P 945	Multan	67

6 **A. ferruginea,** DC , Hook Fl Ind ii 295, Beddome t 51, Brandis 185, Kurz i 423, Gamble 32 ... Ind ii 561 Vern *Khoni*, Nep , *Kaige* ... Berar, *Kar khair*, Gondi , *Phandra khair*, M ... Kan , *Velvelam*, Tam , *Ansandra*, *tella tuma*, *wuni*, Tel

A large deciduous tree Bark ½ inch thick, rough Sapwood large, heartwood olive brown, extremely hard, harder than *A Catechu* Pores moderate sized, generally single, in small rounded patches of softer tissue, which are often confluent and joined into short interrupted concentric bands Medullary rays short, white, fine, numerous.

... imens give 70 lbs. Skinner says it is used for building, ... similar to gum arabic

		lbs
C 872.	Bairagarh Reserve Berar	70
E 2357	Bamunpokri Darjeeling Terai	67
D 1081	North Arcot	73

A piece of red wood B 2529 (57 lbs) collected in Burma in 1862 and marked *Sla* has large and moderate-sized pores filled with resin they are often subdivided and their transverse diameter is greater than the distance between the fine closely packed and prominent medullary rays It evidently belongs to a species of Acacia and in structure resembles *A ferruginea*, which has not yet been described from Burma

7. **A Catechu,** Willd , Hook Fl Ind ii 295, Brandis 186, Kurz i 422, Gamble 32 *A Sundra*, Beddome t 50 *Mimosa Sundra*, Roxb Fl Ind ii 562 Vern *Khair*, Hind , *Khoira*, *koir*, Ass , *Khaira*, Uriya , *Karangalli*, *baga*, Tam , *Sandra*, *nalla sandra*, Tel , *Kagli*, Kan , *Rat kihiri*, Cingh , *Sha*, Burm

A moderate sized, gregarious, thorny, deciduous tree Bark dark grey or greyish brown, rough, exfoliating in long narrow strips Sapwood yellowish white, heartwood either dark or light red, extremely hard The wood grown in the Himalayan valleys shews the annual rings marked by a whitish line and by a larger number of pores in the spring wood Pores moderate sized and large, often subdivided occasionally in radial groups of 2 or 3, and surrounded by narrow rings of softer tissue which are often joined and form interrupted concentric bands Pores frequently filled with a white substance, uniformly distributed except that they are more numerous in the innermost part of each annual ring, distinctly marked on a longitudinal section Medullary rays short, moderately broad, numerous, bent where they touch the pores, which are often larger than the space between two medullary rays

Common in most parts of India and Burma extending in the ... tract ...

A short or small deciduous tree, with rough, dark-grey bark. Wood hard, yellowish white, extremely hard, splits in drying. Pores moderate-sized and large, often oval and subdivided into compartments enclosed in wavy and irregular concentric bands of softer tissue, which are frequently interrupted. Medullary rays fine and moderately broad, wavy, prominent in the bands of darker and finer tissue, which alternate with those of soft texture.

Sind, Suliman range, Berar, Dekkan and South India.
Weight, 52 lbs. per cubic foot.

		lbs.
C 844.	Amraoti Reserve, Berar	52

4. **A. leucophlœa,** Willd.; Hook. Fl. Ind. ii. 294; Beddome t. 48; Brandis 184; Kurz i. 421. *Mimosa leucophlœa*, Roxb. Fl. Ind. ii. 558. Vern. *Rerú, raunj, karír, nimbar, ringa, rinj, rohani, jhind, safed kikar*, Hind.; *Arinj*, Rajputana; *Raundra, runjra*, Banswara; *Renuja*, Bijeragogarh; *Tumma*, Gondi; *Hewar*, Mar.; *Velvaylam, vel-vaghe*, Tam.; *Tella-túma, harwar*, Tel.; *Bili jáli, topal, naibela*, Kan.; *Katu andara*, Cingh.; *Tanoung*, Burm.

A moderate-sized or large deciduous tree. Bark ⅓ inch thick; colour varying with age, grey and smooth when young, dark brown, almost black, and rough when old, exfoliating irregularly in patches and strips. Sapwood large; heartwood reddish brown with lighter and darker streaks, extremely hard. Pores moderate-sized, uniformly distributed in patches or short irregular concentric belts of white tissue which are prominent in, and alternate with, the dark-coloured firm tissue which separates the medullary rays. The latter are white, fine and moderate, and often slightly bent.

Plains of the Punjab from Lahore to Delhi, and in all forest tracts of Central and South India and Burma.

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		lbs.
P 947.	Lahore	50
C 1118.	Ahiri Reserve, Central Provinces	59

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Growth slow. Weight, according to J. L. Stewart, 55 lbs.; our specimens vary from 67 to 72; average 69 lbs. A most beautiful wood, strong and durable; valuable for cart-wheels, sugarcane crushers, Persian water-wheels and agricultural implements.

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		lbs
P 164	Hoshiarpur (J L Stewart 1860)	72
P 944.	Gujerat	68
P 945	Multan	67

6 **A. ferruginea,** DC, Hook Fl Ind ii 295; Beddome t 51, Brandis 185, Kurz i 423, Gamble 32 *Mimosa ferruginea,* Roxb Fl Ind ii 561 Vern *Khoui*, Nep, *Kaiger*, Panch Mehals, *Son khair*, Berar, *Kar khair*, Gondi, *Phandra khair*, Mar., *Teóri khair*, Bhil, *Banni*, Kan, *Velvelam*, Tam, *Ansandra, tella tuma, wúni*, Tel

A large deciduous tree Bark ½ inch thick, rough Sapwood large, heartwood olive brown, extremely hard, harder than *A Catechu* Pores moderate sized, generally single, in small rounded patches of softer tissue, which are often confluent and joined into short interrupted concentric bands Medullary rays short, white, fine, numerous.

Northern B[illegible]

[illegible] imens give 70 lbs. Skinner says it is used for building, similar to gum arabic

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7 **A Catechu,** Willd, Hook Fl Ind ii 295, Brandis 186, Kurz i 422, Gamble 32 *A Sundra,* Beddome t 50 *Mimosa Sundra,* Roxb Fl Ind ii 562 Vern *Khair*, Hind, *Khoira, koir*, Ass, *Khaira*, Uriya, *Karangalli, baga*, Tam, *Sandra, nalla sandra*, Tel, *Kachi*, Kan, *Rat kihiri*, Cingh, *Sha* Burm

A moderate sized, gregarious, thorny, deciduous tree Bark dark grey or greyish brown, rough, exfoliating in long narrow strips Sapwood yellowish white, heartwood either dark or light red, ext[reme]ly hard The wood grown in the Himalayan valleys shews the annual rings marked by a whitish line and by a larger number of pores in the spring wood Pores moderate sized and large, often subdivided, [illegible] ally in radial groups of 2 or 3, and surrounded by narrow rings of [illegible] tissue which are often joined and form interrupted concentric bands Pores frequently filled with a white substance, uniformly distributed except that they are more numerous in the innermost part of each annual ring, distinctly marked on a longitudinal section Medullary rays short, moderately broad, numerous, bent where they touch the pores, which are often larger than the space between two medullary rays

Common in most parts of India and Burma, extending in the Sub-Himalayan tract westwards to the Indus

The growth of the Himalayan trees whose rings [illegible] being 5 rings per inch [illegible]

Weight, 43 to 52 lbs. per cubic foot. The wood is used to make furniture. The tree is extremely handsome when in flower, with its innumerable pink tassels of delicate silky blossoms, from which it derives its name *guláb-resham*, rose silk.

			lbs.
II	97.	Sutlej Valley, Simla, 4,000 feet	52
II	152.	Sainj, Simla, 4,000 feet	43

6. **A. stipulata**, Boivin; Hook. Fl. Ind. ii. 300; Beddome t. Fl.; Brandis 178; Kurz i. 426; Gamble 34. *Mimosa stipulacea*, Roxb. 55, Ind. ii. 549. Vern. *Oi, oë, sirín, shirsha, kasír*, Pb.; *Siran, kanujer a. pattia, samsundra*, Hind.; *Kala siris*, Nep.; *Singriang*, Lepcha; *Sow*, Ass.; *Selcho*, Garo; *Chakua, amluki*, Beng.; *Kat turanji*, Tam.; *Konda chiragu, chindaga*, Tel.; *Kal baghi, hote baghi*, Kan.; *Kabal*, Cingh.; *Pokoh*, Magh; *Boomaiza*, Burm.

A large, deciduous, fast-growing tree. Bark grey, with numerous short, vertical wrinkles and a few larger horizontal furrows, with prominent edges, darker when old. Sapwood large, white; heartwood brown, generally not durable, soft, shining. Annual rings distinctly marked. Pores large, often oval and subdivided, very prominent on a longitudinal section. Medullary rays fine, short, reddish, not very distinct.

Sub-Himalayan tract from the Indus eastwards, ascending to 4,000 feet; Oudh, Bengal, Burma, South India.

Growth very rapid. Roxburgh says that a tree he planted in the Botanic Garden at Calcutta measured 48·5 inches in girth at 4 feet above the ground when 7 years old; this would give a rate of growth of slightly less than 1 ring per inch of radius. Stewart, in "Punjab Plants, p. 56," says that a tree in the Saharanpur Gardens was 7 feet in girth at about 17 years of age, which gives rather over 1 ring per inch of radius. Our specimens give 3 to 4 rings per inch of radius. A round in the Bengal Forest Museum from a young tree, shews 11 rings on a mean radius of 6 inches or 1·8 rings per inch of radius. The growth may be taken therefore at 1 to 4 rings per inch of radius, which is very rapid. Weight, according to Skinner, No. 9, 55 lbs.; according to Brandis' Burma List of 1862, No. 27, 66 lbs.; our specimens give only 33 lbs.; and Kyd (*Acacia marginata*, Ham.) 28 lbs. Kyd gives P = 222; and Skinner gives P = 823; but it is doubtful if his experiments were really from wood of *A. stipulata*. The wood is said by Beddome, probably quoting Skinner, to be used for building and for naves of wheels. Kurz says it is good for cabinet work, furniture and similar purposes. Brandis' Burma List, 1862, No. 27, says it is prized for cart-wheels and for the bells of cattle. In Bengal it has been tried for tea-boxes, for which purpose it will probably suit well; also for charcoal. It gives a gum which exudes copiously from the stem, and is used by Nepalese for sizing their "Daphne" paper. The branches are lopped for cattle fodder.

			lbs.
H	603.	Kangra, Punjab	29
O	217.	Garhwal (1868)	28
C	2989.	Jubbulpore, Central Provinces (1863)	39
E	647.	Bamunpokri, Darjeeling Terai	26
E	2362.	" " "	29
E	788.	Kamrúp, Assam	40
E	1956.	Chittagong	25
B	809.	Burma	36
B	2528.	" (1866)	33
B	2221.	Andaman Islands (1866)	45

7. **A. amara**, Boivin; Hook. Fl. Ind. ii. 301; Brandis 178. *A. amara* and *A. Wightii*, Grah.; Beddome t. 61, xcvi. *Mimosa amara* and *M. pulchella*, Roxb. Fl. Ind. ii. 548. Vern. *Lallei*, Dekkan; *Thuringi, wunja, suranji, shekram*, Tam.; *Nallarenga, shekrani, sikkai, narlingi*, Tel.; *Bel-khambi*, Kan.; *Kadsige*, Coorg; *Oosulay*, Mal.

A moderate-sized deciduous tree. Sapwood large; heartwood pur-

plish-brown, beautifully mottled, extremely hard, with alternate, concentric, light and dark bands. Pores small, in patches of white tissue, which are frequently joined, forming concentric bands. Medullary rays very fine, very numerous.

South India and Dekkan [illegible] to 62 lbs Skinner [illegible] tiff, close grained, [illegible] and direct cohesive power, also that it is used for the beams of native houses and carts, the wood of the crooked branches for ploughs and the leaves for washing the hair Beddome says it is a good fuel, and is extensively used for the locomotives at Salem and Bangalore

		lbs
D 1052	Salem, Madras	61
No 6	Salem Collection . . .	62

B 2705 (59 lbs) from Tavoy (Wallich, 1828) is a dark red specimen of a heavy brown wood of *Albizzia* structure, which cannot be identified

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ORDER XII. ROSACEÆ

Contains 20 genera of Indian trees, shrubs or climbers chiefly found in the colder regions of the Himalaya and other mountain ranges It is divided into 7 Tribes, viz —

Tribe I —Chrysobalaneæ	*Parinarium* and *Parastemon*
„ II —Pruneæ .	*Prunus, Maddenia, Pygeum* and *Prinsepia*
„ III —Spiræeæ .	*Spiræa* and *Neillia*
„ IV —Rubeæ . . .	*Rubus*
„ V —Potentilleæ	*Potentilla*
„ VI —Roseæ .	*Rosa*
„ VII —Pomeæ	*Cydonia, Docynia, Eriobotrya, Pyrus, Photinia, Pourthiæa, Stranvæsia, Cratægus* and *Cotoneaster*

xcviii., is a small tree of the Nilgiris; *P. Notoniana*, Wight and Arn.; Beddome t. 192 (*Eriobotrya integrifolia*, Kurz i. 442) Vern. *Kaddi bikki*, Burghers, is a small tree of Eastern Bengal, South India and Burma; *P. integrifolia*, Lindl.; *P. Griffithii*, Dene; and *P. mollis*, Hook. f., are trees of the North-East Himalaya. *Pourthiæa arguta*, Dene; Hook. Fl. Ind. ii. 382, is a small tree of the Khasia Hills and Sikkim Terai.

Wood close and even grained; that of most species apt to warp. Pores small to extremely small. Medullary rays generally fine to extremely fine.

1. PRUNUS, Linn.

Contains 18 species including the Almond, Peach, Apricot, Plum and Cherry. *P. prostrata*, Labill.; Hook. Fl. Ind. ii. 313; Brandis 193. Vern. *Tára, ter, talle*, Pb., is a small shrub of rocky places in Afghanistan and the arid parts of the North-West Himalaya, generally above 7,000 feet. *P. Mahaleb*, Linn.; Brandis 195, is cultivated at Khelat. *P. rufa*, Wall.; Hook. Fl. Ind. ii. 314 (*P. sp.*, Gamble 35) Vern. *Kamki*, Bhutia, is a tree of the inner Sikkim Himalaya above 10,000 feet. *P. punctata*, Hook. f. and Th., is a small tree of the Khasia Hills; and *P. Jenkinsii*, Hook. f. and Th., a small tree of Upper Assam. *P. tomentosa*, Thunb.; Hook. Fl. Ind. ii. 314, is a shrub of Kashmir; and *P. Jacquemontii*, Hook. f., a shrub of the inner North-West Himalaya in Kunawar and Garhwal.

P. Amygdalus, Baillon; Brandis 190. (*Amygdalus communis*, Willd.; Roxb. Fl. Ind. ii. 500.) The Almond. Vern. *Badám*, is cultivated in Afghanistan, Persia, Kashmir and the Punjab. *P. Cerasus*, Linn.; Brandis 193. The Cherry. Vern. *Alú balú*, Pers.; *Kerasya*, Arab.; *Gilás, olchi, krusbal*, Pb., is generally cultivated in the North-West Himalaya between 5,000 and 8,000 feet. *P. Persica*, Bth. and Hk. f.; Hook. Fl. Ind. ii. 313; Brandis 191; Kurz i. 433; Gamble 34. (*Amygdalus persica*, Willd.; Roxb. Fl. Ind. ii. 500). The Peach. Vern. *Ghwareshtái*, Afg.; *Shúft alú*, Pers.; *Aru, aor, chinannu, beinni, beimu, rek*, Pb.; *Aru*, Hind.; *Takpo*, Lepcha, is [com]monly cultivated everywhere throughout the Himalaya and in Upper Burma.

[T]he species here described have a distinct heartwood; the pores are [s]mall or very small. The medullary rays are generally of two classes, fine and moderately broad. The annual rings are marked either by a continuous line of pores or by more numerous pores in the spring wood.

1. P. armeniaca, Linn.; Hook. Fl. Ind. ii. 313; Brandis 191; Roxb. Fl. Ind. ii. 501. The Apricot. Vern. *Hári, gardalu, jaldaru, shíran, cheroli, cher kúsh, serkuji, shari*, Pb.; *Iser*, Kashmir; *Chúari, zardalu, khoobani*, Hind.; *Mishmish*, Pers.

A moderate-sized deciduous tree. Bark dark brown, rough, with narrow longitudinal clefts. Sapwood white; heartwood greyish brown, mottled with dark-brown streaks, moderately hard. Annual rings marked by a narrow continuous belt of pores, which are larger than the very small scattered pores in the outer portion of the ring. Medullary rays of two classes, numerous; very fine rays between fewer moderately broad ones.

Cultivated in the North-West Himalaya. Growth moderate, 4 to 8 rings per inch of radius.

Weight, 49 lbs. per cubic foot; Mathieu, Fl. For. p. 131, gives 58 lbs. Wood handsome, used for various purposes in the Punjab Hills. In Lahoul and Upper Kanawar it is the chief firewood. The fruit, fresh or dried, is extensively used for food, and an oil is extracted from the kernels which is used to burn, in cooking and for the hair.

			lbs.
H	781.	Bathri, Chamba, 3,000 feet	49
H	20.	Madhan, Simla, 6,000 feet	49
H	2876.	Matiyána, Simla, 7,000 feet	...

2. P. communis, Huds.; Hook. Fl. Ind. ii. 315; Brandis 192. The Plum. Vern. *Alúcha, olchi, er, aor, gardalu*, Pb.

A moderate-sized tree. Wood reddish brown, hard, very close-grained, warps and splits Annual rings marked by a belt of small, closely packed pores. Pores in the main portion of the annual ring extremely small, in groups. Medullary rays of two classes, moderately broad, numerous, with very fine rays between them.

Cultivated (or indigenous, Hook Fl Ind) from Garhwal to Kashmir in the Western Himalaya, from 5,000 to 7,000 feet

Growth fast, 2 to 3 rings per inch of radius Weight, 52 lbs per cubic foot The wood is smooth to work, and is used in Kashmir for the skeleton of the so called papier-maché boxes

		lbs
H 151.	Giri Valley, Simla, 4,000 feet	52

3. **P. Puddum**, Roxb.; Hook. Fl. Ind. ii. 314, Brandis 194; Kurz i 434.; Gamble 34. Vern. *Chamiári, amalgúch, páya, pajia*, Pb., *Paddam, páya*, Hind.; *Kongki*, Lepcha.

A moderate-sized (in Sikkim, a large) deciduous tree. Bark peeling [illegible] Sapwood large, greenish white. [illegible] on a radial section by narrow, [illegible] ately hard. Annual rings distinctly marked by an irregular and not continuous belt of numerous pores. Pores small; those of the spring wood very small, frequently arranged in oblique lines intersecting the medullary rays at an angle. Medullary rays of two classes; numerous, very fine rays alternating with fewer, short, moderately broad rays, which are broader than those of *P. Padus*. Scent pleasant, resembling that of *P Mahaleb*.

Wild in the Himalaya, from the Indus to Assam, between 2,500 and 7,000 feet, Khasia Hills

Growth variable, from 4 to 22 rings per inch of radius, the average being 12

Weight, the average of our specimens give 44 lbs per cubic foot Gamble says 40 to 45 lbs

The wood is used in the Punjab Himalaya for walking-sticks; in Darjeeling occasionally for furniture It deserves to be better known, and to be more extensively used, as, at any rate in Sikkim, it is common and reaches a large size. It gives an abundant gum, not used

			lbs
H	46	Nagkanda, Simla, 7,000 feet	52
H	234	Garhwal Hills (1868)	16
E	683	[illegible]	12
E	2363	[illegible]	41
E	2364.	[illegible]	18
E	1417.	[illegible]	37

4. **P. Padus**, Linn.; Hook. Fl. Ind. ii. 315; Brandis 194; Gamble 35. The Bird Cherry. Vern. *Páras, kalakat, gidar-dák, bart, zúm, zam, zambu, jamu, chúle, dúdla, krún*, Pb.; *Jamana*, Hind.; *Likh-aru, arupatti*, Nep.; *Hlo sa hlot-kúng*, Lepcha.

A moderate-sized deciduous tree, with dark, rough bark. Sapwood large, whitish. Heartwood reddish brown, with an unpleasant smell, beautifully mottled on a radial section by the shining medullary rays, [illegible] marked by a narrow belt of [illegible] small, in irregularly shaped [illegible] Medullary rays short, moderately broad.

Himalaya, from the Indus to Sikkim, between 4,000 and 10,000 feet.

Growth, varying from 4 to 30 rings per inch of radius, the average of our speci-

mens gave 13 rings. Average weight 41 lbs. per cubic foot, Mathieu Fl. For. p. 128, gives an average of 41·5 lbs. The wood has often a very handsome grain and deserves to be better known; it is scarcely ever used.

			lbs.
H	916.	Hazara, 7,000 feet	38
H	22.	Matiyána, Simla, 7,000 feet	42
H	58.	Nagkanda, Simla, 8,000 feet	43
E	696.	Rangbúl Forest, Darjeeling, 7,000 feet	41
E	2369.	" " "	42

The two Darjeeling specimens are perhaps *P. nepalensis*, Ser.; Hook. Fl. Ind. 316.

5. P. acuminata, Wall.; Hook. Fl. Ind. ii. 317; Gamble 35 (*wrongly* Roxb.).

A tree with thin dark bark. Wood reddish brown. Pores small, sometimes in groups or radial lines; medullary rays of two classes; numerous, very fine rays, alternating with fewer, short, broad ones.

Eastern Himalaya and Khasia Hills from 4,000 to 7,000 ft.

E 3309. Sureil, Darjeeling, 6,000 feet.

6. P. martabanica, Wall.; Hook. Fl. Ind. ii. 316; Kurz i. 434. Vern. *Thitmanku*, Burm.

No. B 1975, collected by Kurz in the Andamans in 1866, bears this name. It is a heavy, cross-grained, red wood, with moderate-sized pores, often subdivided, and fine, closely packed, uniform medullary rays.

2. PYGEUM, Gaertn.

No. 28, Adrian Mendis' Ceylon Collection, marked *Cryptocarya floribunda*, and *Galmorre*, Cingh., is a close-grained yellow wood with a structure resembling that of *Eriobotrya*. It is probably *Pygeum zeylanicum*, Gaertn.; Hook. Fl. Ind. ii. 321; Thwaites Enum. Fl. Zeyl. 102. Vern. *Galmora*, Cingh. (Weight 65 lbs. per cubic foot.) A large tree of South India and Ceylon, which gives a good firewood for burning bricks or lime. There are 8 other species of this genus. *P. acuminatum*, Colebr.; Hook. Fl. Ind. ii. 318; Kurz i. 435; Gamble 35, is a tree of the North-East Himalaya, Khasia Hills, Eastern Bengal and Chittagong, in which regions are also found *P. glaberrimum*, Hook. f.; and *P. montanum*, Hook. f. *P. Andersoni*, Hook. f., has been found on the summit of Parasnáth in Behar at 4,000 ft.; *P. Wightianum*, Bl. (*P. ceylanicum*, Beddome t. 59) and *P. Gardneri*, Hook. f., are large trees of South India; while *P. arboreum*, Endl., and two other species are found in the forests of Burma, chiefly in Tenasserim.

3. PRINSEPIA, Royle.

1. P. utilis, Royle; Hook. Fl. Ind. ii. 323; Brandis 196. Vern. *Bhekal, bekkra, karanga, cherara, dhatela, jhatela*, Hind.; *Gurinda*, Hazara; *Tatúa, phulwara*, Rajaori; *Jinti*, Chenab; *Bekling*, Kanawar.

A deciduous, thorny shrub, with thin brown bark, peeling off in small vertical flakes. Sapwood white; heartwood red, very hard and compact, close and even grained, but much liable to split. Annual rings marked by a narrow continuous belt or line of larger pores; the pores outside this belt are small. The pores are sometimes filled with a white substance. Medullary rays very fine and numerous.

Outer Himalaya, from Hazara to Bhutan between 2,000 and 9,000 feet. Khasia Hills.

Growth slow, 12 rings per inch of radius. Weight, 69 lbs. per cubic foot. The

wood is only used for fuel and occasionally for walking sticks An oil is expressed from the seeds which is used for food and for burning

			lbs
H	49	Nagkanda, Simla 8 000 feet	69
H	2868	, ,	

4 SPIRÆA, Linn

Contains 11 species found in the Himalaya chiefly at elevations above 6 000 feet They contain both herbs such as the Meadow Sweet found in Kashmir, and shrubs, few of which attain any size The two described are the most important

1. S sorbifolia, Linn , Hook Fl Ind ii 324 *S Lindleyana,* DC Vern *Sarbashtai, kikri, batu,* Pb

A shrub, with reddish grey bark Wood hard, compact, even grained Annual rings distinctly marked by a belt of more numerous pores Pores small, scanty in the outer part of each annual ring Medullary rays moderately broad

North West Himalaya from the Sutlej to Kumaun above 7 000 feet

Growth moderate 12 rings per inch of radius The largest growing species Recognised by its pinnate leaves from the other shrubby species It is chiefly found in shady damp woods

			lbs.
H	82	Simla 7 000 feet	49
H	3014	Hattu Forest Simla 8 000 feet	...

2 S canescens, Don , Hook Fl Ind ii 325 Vern *Chaku, taku,* Simla

Structure similar to that of *S sorbifolia*

North West Himalaya, from Murree to Kumaun

Growth moderate 12 rings per inch of radius Found chiefly on open hill sides as a stiff bush Very handsome in flower in the spring

			lbs
H	159	Simla 7 000 feet	47
H	2827	Mahasu Simla 8 000 feet	...

5 RUBUS, Linn

Contains 40 species of erect trailing or climbing generally thorny shrubs Many species are known on account of their edible fruits the best of which is perhaps *R ellipticus R fruticosus,* Linn Hook Fl Ind ii 337 Brandis 197 The Blackberry or Bramble Vern *Ankri alish kanachi chench, pakhana* Pb is found

mens gave 13 rings. Average weight 41 lbs. per cubic foot, Mathieu Fl. For. p. 128, gives an average of 41·5 lbs. The wood has often a very handsome grain and deserves to be better known; it is scarcely ever used.

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E	2369.	" " "	42

The two Darjeeling specimens are perhaps *P. nepalensis*, Ser.; Hook. Fl. Ind. 316.

5. P. acuminata, Wall.; Hook. Fl. Ind. ii. 317; Gamble 35 (*wrongly* Roxb.).

A tree with thin dark bark. Wood reddish brown. Pores small, sometimes in groups or radial lines; medullary rays of two classes; numerous, very fine rays, alternating with fewer, short, broad ones.

Eastern Himalaya and Khasia Hills from 4,000 to 7,000 ft.

E 3309. Sureil, Darjeeling, 6,000 feet.

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A deciduous, thorny shrub, with thin brown bark, peeling off in small vertical flakes. Sapwood white; heartwood red, very hard and compact, close and even grained, but much liable to split. Annual rings marked by a narrow continuous belt or line of larger pores; the pores outside this belt are small. The pores are sometimes filled with a white substance. Medullary rays very fine and numerous.

Outer Himalaya, from Hazara to Bhutan between 2,000 and 9,000 feet. Khasia Hills.

Growth slow, 12 rings per inch of radius. Weight, 69 lbs. per cubic foot. The

wood is only used for fuel and occasionally for walking sticks An oil is expressed from the seeds which is used for food and for burning

			lbs
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H	2868		

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A shrub, with reddish grey bark Wood hard, compact, even grained Annual rings distinctly marked by a belt of more numerous pores Pores small, scanty in the outer part of each annual ring Medullary rays moderately broad

North West Himalaya from the Sutlej to Kumaun above 7 000 feet

Growth moderate 12 rings per inch of radius The largest growing species Recognised by its pinnate leaves from the other shrubby species It is chiefly found in shady damp woods

			lbs
H	82	Simla 7 000 feet	49
H	3014	Hattu Forest Simla 8 000 feet	...

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Structure similar to that of *S sorbifolia*

North West Himalaya from Murree to Kumaun

Growth moderate 12 rings per inch of radius Found chiefly on open hill sides as a stiff bush Very handsome in flower in the spring

			lbs
H	159	Simla 7 000 feet	47
H	2827	Mahasu Simla 8 000 feet	...

5 RUBUS, Linn

fruit found in the Roxb and two other species but too small

and too numerous for mention here

1. R. ellipticus, Smith; Hook. Fl. Ind. ii. 336. *R. flavus*, Ham., Brandis 197; Kurz i. 438; Gamble 35. *R. Gowreephul*, Roxb. Fl. Ind. ii. 517. Vern. *Akhi, ankri, kunáchi, guracha, pukana*, Pb.; *Esar, hishalu, hisalu*, Kumaun; *Tolu aselu, escalu, cesi*, Nep.; *Kashyem*, Lepcha.

A large thorny shrub with brown bark and moderately hard, light-brown wood. Pores small; medullary rays short, very broad and moderately broad.

Himalaya, from the Indus to Bhutan, between 1,500 and 8,000 feet; Khasia Hills and Assam.

The fruit is yellow and with the flavour of the raspberry; it is commonly eaten and made into preserves in the Himalaya, and is certainly one of the best of the wild fruits of India.

E 2367. Tukdah Forest, Darjeeling, 5,000 feet.

2. R. lasiocarpus, Smith; Hook. Fl. Ind. ii. 339; Brandis 198; Kurz i. 439; Gamble 36. Vern. *Gunacha, pukana*, Hazara; *Kandiári, kharmuch, súrganch*, Kashmir; *Túlanch*, Chenab; *Niú, kalliachi*, Beas; *Klenchu, galka*, Simla; *Kalga*, Sutlej; *Kalawar, kala hisalu*, Kumaun; *Kala aselu*, Nep.; *Kajutalam*, Lepcha.

Bark smooth. Structure similar to that of *R. ellipticus*.

Himalaya, Khasia Hills, Burma, South India and Ceylon.

The fruit has a glaucous blue-black colour; it is small, but of good flavour.

E 2368. Tukdah Forest, Darjeeling, 5,000 feet.

3. R. lineatus, Reinw.; Hook. Fl. Ind.ii. 333; Gamble 36. Vern. *Gempé aselu*, Nep.

A large thornless shrub with red bark peeling off in papery flakes. Wood yellowish brown, in structure resembling that of *R. ellipticus*.

Sikkim Himalaya, 6,000 to 9,000 feet.

Stems used to make fences. Fruit red, edible.

E 3307. Darjeeling 7,000 feet.

6. ROSA, Linn.

Contains 9 species without including those cultivated in India, full account of which is given in Brandis' Forest Flora, and referred to in the Flora Indica ii. 363. *Rosa involucrata*, Roxb. Fl. Ind. ii. 513, is a sub-scandent shrub of the banks of streams in the Gangetic plain, westward to Mount Aboo and eastward to Burma. *R. Eglanteria*, Linn.; Hook. Fl. Ind. ii. 366 (*R. lutea*, Mill.; Brandis 201), is a shrub of the arid parts of the inner Himalaya, with yellow flowers. *R. Webbiana*, Wall; Hook. Fl. Ind. ii. 366; Brandis 202. Vern. *Kantián, shingári*, Hazara; *Shikand, shawali, manayar, brazen*, Chenab; *Chúa*, Lahoul; *Sia*, Ladak, Piti; *Ringyal*, Kanawar, is a pink-flowered erect shrub of the same region. *R. anserinæfolia*, Boiss.; Hook. Fl. Ind. ii. 365, is a common, wild and cultivated, white-flowered rose of Afghanistan. *R. longicuspis*, Bertol.; Hook. Fl. Ind. ii. 367, is a climber of the Khasia Hills from 2,000 to 5,000 feet; and *R. Leschenaultiana*, W. and A.; Hook. Fl. Ind. ii. 368, a climber of the Nilgiri and Pulney Hills.

1. R. moschata, Mill.; Hook. Fl. Ind. ii. 367; Brandis 201. Vern. *Kuji, kajei, karer, kwia, kwiala*, Hind.; *Phulwara, chal*, Kashmir.

A large, thorny, climbing shrub. Bark greyish brown. Wood moderately hard, porous. Annual rings marked by a continuous line of large pores in the spring wood, the pores in the autumn wood being scanty and small. Medullary rays broad to very broad.

North-West Himalaya, from Afghanistan to Nepal, ascending to 11,000 feet.
A tall climber, very sweet scented, and very ornamental when in flower in May and June. Flowers white. Growth slow, 15 rings per inch of radius.

H 115. Bhajji, Simla, 5,000 feet.

2. R. sericea, Lindl.; Hook. Fl. Ind. ii. 367; Brandis 202; Gamble 36.
A thorny shrub with greyish brown bark, peeling off in papery flakes. Wood very hard, darkening on exposure. Annual rings marked by a continuous line of very small pores in the spring wood, the pores in the autumn-wood being extremely small. Medullary rays short, moderately broad to broad, prominent.

Himalaya, from the Sutlej to Bhutan, from 9,000 to 14,000 feet.
Growth slow, 18 rings per inch of radius. Flowers white or pink.

E 2366. Suburkum, Darjeeling, 11,000 feet.

3. R. macrophylla, Lindl.; Hook. Fl. Ind. ii. 366; Brandis 203. Vern. *Guláb, ban-guláb,* Hind.; *Tikjik,* Chenab; *Akhiari,* Ravi; *Breri, bankoi,* Simla.
A thorny shrub. Bark blackish brown, peeling off in thin flakes. Wood hard and compact; annual rings marked by a belt of numerous small pores in the spring wood; pores in the rest of the wood extremely small. Medullary rays moderately broad to broad, prominent.

[illegible] Flowers pin[illegible]

			lbs.
H	50.	Nagkanda, Simla, 8,000 feet	...
H	2872.	" " "	55
H	2847.	Mahasu, Simla "	59

7. ERIOBOTRYA, Lindl.

Contains 9 species. *E. japonica,* Lindl.; Hook. Fl. Ind. ii. 372; Brandis 575 [illegible] are shrubs or small trees.

1. E. dubia, Dcne; Hook. Fl. Ind. ii. 371. *Photinia dubia,* Lindl. Gamble 37. Vern. *Berkúng,* Lepcha.
A small tree. Bark light brown, ½ inch thick. Wood white, soft, even grained. Pores very small. Medullary rays of two classes, numerous very fine rays closely packed between fewer moderately broad rays.

North-East Himalaya, from 5,000 to 6,000 feet.
Weight, 46 lbs. per cubic foot.

E 2365. Rangbúl, Darjeeling, 7,000 feet.

2. E. elliptica, Lindl.; Hook. Fl. Ind. ii. 372. *Photinia sp.* Gamble 37. Vern. *Mihul, mya,* Nep.; *Yelnyo,* Lepcha.
A moderate-sized evergreen tree. Bark greyish brown, ½ inch thick. Wood reddish brown, compact, hard, apt to warp slightly. Pores small and very small. Medullary rays fine and very fine, very numerous, prominent on a radial section.

Sikkim and Bhutan Himalaya, from 6,500 to 8,000 feet.

Growth moderate. Aikin, describing Wallich's specimens gives 8·4 rings; our specimens shew 10 rings per inch of radius. Weight, 57·5 lbs. per cubic foot. Wood good, but not used.

			lbs.
E	366.	Rangbúl, Darjeeling, 7,000 feet	58
E	3109.	Darjeeling, 7,000 feet	57

8. PYRUS, Linn.

Contains 22 species, all found in the Himalaya and Khasia Hills, one only extending southward to Burma. The genus is divided into 5 sections: *Malus*, 3 species; *Pyrus*, 4 species; *Aria*, 2 species; *Sorbus*, 5 species; and *Micromelus*, 8 species.

In the section *Malus*, besides *P. baccata*, Linn., *P. Malus*, Linn.; Hook. Fl. Ind. ii. 373; Roxb. Fl. Ind ii. 511; Brandis 205. The Apple. Vern. *Shewa*, Afg.; *Shu, sun, chúnt, khajir, bisír, palu*, Pb.; *Kúshú*, Ladak; *Seo, seb*, Hind., is apparently wild and commonly cultivated in the North-West Himalaya. It is also cultivated in gardens in Berar, Central India, the Punjab and Sind. *P. sikkimensis*, Hook. f.; Hook. Fl. Ind. ii. 373, is found in the Sikkim Himalaya.

In the section *Pyrus*, besides *P. Pashia*, Ham., *P. communis*, Linn.; Hook. Fl. Ind. ii. 374; Roxb. Fl. Ind. ii. 510; Brandis 203. The Pear. Vern. *Tang, batang, nák, bo, sunkeint, charkeint, lí*, Pb. Hills; *Náshpáti, nák*, Pb. Plains; *Amrúd*, Arab. is apparently wild in Kashmir and cultivated in the Himalaya. The fruit is generally hard, but good for baking and preserves. *P. Kumaoni*, Dcne; Hook. Fl. Ind. ii. 374; Brandis 204, and *P. Jacquemontiana*, Dcne; Hook. Fl. Ind. ii. 374; Brandis 205, are found in the North-West Himalaya; they much resemble *P. Pashia.*

In the section *Aria*, two species only occur; they are here described.

In the section *Sorbus*, besides *P. foliolosa*, *P. Aucuparia*, Gaertn.; Hook. Fl. Ind. ii. 375, the Mountain Ash, is found in the North-West Himalaya from 11,500 feet to 13,000 feet from Kashmir to Kumaun; and *P. microphylla*, Wall., *P. Wallichii*, Hook. f., and *P. insignis*, Hook. f., in the Sikkim Himalaya.

In the section *Micromelus*, *P. Griffithii*, Dcne.; *P. rhamnoides*, Dcne; and *P. Thomsoni*, King, are described from high elevations in the Sikkim Himalaya; *P. ferruginea*, Hook. f., from Bhutan; and 4 species: *P. khasiana*, Dcne, *P. granulosa*, Bertol. (Vern. *Dingsopha*, Khasia), *P. polycarpa*, Hook. f., and *P. cuspidata*, Bertol., from the Khasia Hills.

Wood compact and close-grained, marked by very small pores and fine medullary rays. The wood of the Pears (sections *Pyrus* and *Malus*) warps and cracks, whereas that of the sections *Sorbus* and *Aria* seasons better.

1. P. baccata, Linn.; Hook. Fl. Ind. ii. 373; Brandis 205. The Siberian Crab. Vern. *Ban mehal, gwálam*, Hind.; *Baror, liú, lhijo, líwar*, Pb.

A small tree with grey bark. Wood white, with pale-brown heartwood, warps considerably. Structure similar to that of *P. Pashia*, but medullary rays slightly broader.

Himalaya, from the Indus to Bhutan, between 6,000 and 11,000 feet; Khasia Hills.

Growth slow, 12 rings per inch of radius. Weight, 53 lbs. per cubic foot. Fruit edible.

			lbs.
E	967.	Chumbi Valley, Tibet, about 10,000 feet	53

2. P. Pashia, Ham.; Hook. Fl. Ind. ii. 374; Kurz i. 441. *P. variolosa*, Wall.; Brandis 204, 575; Gamble 36. Vern. *Tang, batangi, keint, shindar, katári, kíthu, ku, shegul*, Pb.; *Mehal, mol*, Hind.; *Passi*, Nep.; *Li*, Lepcha.

A moderate-sized deciduous tree. Bark dark brown, exfoliating in

small rectangular scales Heartwood light reddish brown, hard, close and even-grained, cracks and warps Annual rings marked by a dark line Pores very small Medullary rays very fine and very numerous, uniform and equidistant

The
The

			lbs
H 3185	Dungagalli Hazara 7 000 feet		–
H 23	Madhan Simla 6 000 feet		47
H 236	Garhwal Hills (1868)		

3 **P. lanata,** Don, Hook Fl Ind ii 375 *P Aria,* Ehrh, Brandis 206 Vern *Gun palos,* Afg, *Doda, chola, chilana, maila, paltu, ban pala, kanghi, thanki, morphal, marpol,* Pb, *Galion, mauli, paltu, ban palti,* Hind

A moderate sized deciduous tree with dark-brown bark Wood white, moderately hard, close and even-grained, seasons well Annual rings marked by a narrow belt without pores, on the outside of each ring Pores very small, most numerous in the spring wood Medullary rays fine.

Himalaya
Growth sl
gives 46 to 5
and even grai
Medlar (*P germanica* Ldl)

			lbs
H 64	Naghanda, Simla 8 000 feet		47
H 2887	Naghanda Simla, 8 000 feet		40
H 3186	Dungagalli, Hazara, 7 000 feet		

4. **P. vestita,** Wall, Hook Fl Ind ii 375 *P lanata,* Don, Gamble 37 Vern *Mayhell, gúhor,* Nep, *Singha,* Bhutia

A deciduous tree Wood reddish with brown streaks, moderately hard Annual rings distinct Pores very small Medullary rays fine, numerous, not distinct

Eastern Himalaya between 8 000 and 10 000 feet
Growth slow, 20 rings per inch of radius Weight 44 lbs per cubic foot Fruit edible

		lbs
E 380	Tonglo, Darjeeling 10,000 feet	44

5. **P. foliolosa,** Wall, Hook Fl Ind ii. 376, Brandis 207, Gamble 37. Vern *Kharsani,* Nep

A shrub or small tree Wood white, with small, darker coloured heartwood Annual rings distinct Pores very small, more numerous in the spring wood Medullary rays fine, very numerous

Eastern Himalaya between 7,000 and 10 000 feet
Growth slow, 23 rings per inch of radius Weight, 45 lbs per cubic foot

		lbs
E 378	Tonglo Darjeeling 10 000 feet	45

6 **P. ursina,** Wall, Brandis 206 *P. foliolosa,* Wall; Hook F Ind ii 376 (in part) Vern *Salia, kália,* Pb, *Hampi li*

A small tree with smooth, reddish grey bark, peeling off in horizontal papery strips. Wood white, with a small, brown heartwood. Structure similar to that of *P. foliolosa.*

Himalaya, from the Indus to Sikkim, between 6,000 and 12,000 feet.
Growth slow, 32 rings per inch of radius. Weight, 54 lbs. per cubic foot.

		lbs.
H 134.	Lahoul, 10,000 feet	...
H 3020.	Hattu, Simla, 10,000 feet	54

9. STRANVÆSIA, Lindl.

1. S. glaucescens, Lindl.; Hook. Fl. Ind. ii. 382; Brandis 210. Vern. *Garmehal, súnd,* Kumaun.

A small evergreen tree. Bark ⅓ inch thick, rough, dark coloured. Wood light coloured when fresh cut, turning reddish brown on exposure, fine and even grained; annual rings marked by a thin line. Pores very small, numerous. Medullary rays numerous, uniform, very fine, equidistant.

Central Himalaya, Kumaun and Garhwal from 3,000 to 8,000 feet, Nepal, Khasia Hills.
Growth moderate, 7 rings per inch of radius. Weight, 48 lbs. per cubic foot.

		lbs.
H 2970.	Naini Tál, 6,000 feet	48

10. CRATÆGUS, Linn.

Contains 3 species. *C. Oxyacantha,* Linn.; Hook. Fl. Ind. ii. 383; Brandis 207; Gamble 37. The Hawthorn. Vern. *Ring, ramnia, pingyat, phindák, patakhan,* Pb.; *Ban-sanjli, súr sinjli,* Jhelam, is a small tree of Afghanistan and the Western Himalaya, from the Indus to the Ravi; elsewhere cultivated. *C. Clarkei,* Hook. f.; Hook. Fl. Ind. ii. 383, is a small tree of Kashmir.

1. C. crenulata, Roxb. Fl. Ind. ii. 509; Hook. Fl. Ind. ii. 384. *C. Pyracantha,* Persoon; Brandis 208. Vern. *Gingaru, giauru,* Hind.

A large spinescent shrub. Wood white, hard, very close and even grained. Annual rings marked by a belt of harder and darker-coloured wood on the outer edge of each ring. Pores very small, numerous. Medullary rays very fine, numerous.

Himalaya, from the Sutlej to Bhutan, from 5,000 to 7,000 feet, descending in Kumaun to 2,500 feet.

		lbs.
H 2967.	Naini Tál	48

11. COTONEASTER, Linn.

Contains 10 or 11 species, many of which are merely small prostrate shrubs. They are all Himalayan, one only extending to the Nilgiris and one (doubtfully) to the Khasia Hills. *C. frigida,* Wall.; Hook. Fl. Ind. ii. 385; Brandis 209, is a small tree of the Central and Eastern Himalaya. *C. buxifolia,* Wall.; Hook. Fl. Ind. ii. 387; Beddome xcvii.; Brandis 210. Vern. *Húrínuy,* Nilgiris, is a rigid shrub or small tree of the Nilgiri and Pulney Hills, with a dense elastic wood used by the Todas to make clubs. The remaining species not here described are all small.

Wood harder and more compact than that of *Pyrus;* also marked by extremely small pores.

1. C. bacillaris, Wall , Hook Fl Ind ii. 384; Brandis 208 Vern. *Rí, riu, lin, lún, rán, reúsh, rish,* Pb. Hills; *Ruinsh,* Jaunsar Bawur.

A small deciduous tree with bluish grey, nearly smooth bark. Wood white, turning light red towards the centre, smooth, very hard, close and even grained, but splits and warps much. Annual rings marked by the darker colour of the outer portion of each ring. Pores extremely small, uniformly distributed. Medullary rays very fine, very numerous.

Salt Range above 1,500 feet, North West Himalaya, from the Indus to the Sarda, between 5 000 and 10,000 feet, Sikkim and Bhutan

ht, on an average, 57 lbs per

the "alpenstocks' sold at

			lbs
H	55	Nagkanda, Simla, 8,000 feet	61
H	2890	" " "	
H	26	Madhan, Simla, 6 000 feet .	. 58
H	121	Kulu, about 7,000 feet .	52
H	925	Hazara " "	56
H	3177	Dungagalli, Hazara, 7,000 feet	. ...

2. C. acuminata, Lindl , Hook Fl. Ind. ii 385, Brandis 209 Vern *Riú, ráuns, riús, ruinsh,* Hind

A deciduous shrub. Wood hard, structure like that of *C bacillaris.*

bic foot Wood

			lbs
H	120	Jalaori Pass, Kulu, 9,000 feet	. 54
H	2889	Nagkanda, Simla, 8,000 feet	.
H	3013		

3. C. microphylla, Wall.; Hook. Fl Ind. ii. 387, Brandis 209, Gamble 37. Vern. *Khárіz, lúni,* Kashmir, *Garri,* Kumaun

A small procumbent shrub Wood hard, similar to that of *C. bacillaris,* but with slightly larger pores

Himalaya, from Kashmir to Bhutan, from 4 000 to 8,000 feet in the North-West and above 10,000 feet in Sikkim Often planted for ornament in England

Growth slow, 24 rings per inch of radius

H 2823 Simla, 7,000 feet.

Order XLII. SAXIFRAGEÆ.

An Order of about 8 Indian arboreceous genera, chiefly Himalayan It is divided into 3 tribes of woody plants, viz.,—

Tribe I —Hydrangeæ	*Hydrangea, Pileostegia, Dichroa, Deutzia* and *Philadelphus*
" II —Escalloniеæ	*Itea* and *Polyosma*
" III —Ribesieæ . .	*Ribes*

Five of these genera are here described *Pileostegia viburnoides,* Hook. f. and

Kumaun, is a small tree or ...

between 3,000 and 6,000 feet. *I. macrophylla,* Wall.; Hook. Fl. Ind. ii. 408; Gamble 38. Vern. *Teturldumm,* Lepcha is a small tree of the valleys round Darjeeling and in the Khasia Hills. *I. Chinensis,* Hook. and Arn.; Hook. Fl. Ind. ii. 408, is a small tree of the Khasia Hills between 4,000 and 6,000 feet. *Polyosma integrifolia,* Bl.; Hook. Fl. Ind. ii. 409. (*P. Wallichii,* Bennett; Kurz 444) is a small tree of the Khasia Hills, found also in the Andaman Islands.

Pores small to extremely small. Medullary rays often of two classes, moderately broad and very fine.

1. HYDRANGEA, Linn.

Contains 5 Indian species. Besides those described, the chief is *H. altissima,* Wall.; Brandis 211; Gamble 38. Vern. *Sema,* Lepcha, a large climbing or erect shrub of the Himalaya from the Sutlej to Bhutan above 5,000 feet; its bark is used as a substitute for paper. *H. aspera,* Don, and *H. stylosa,* Hook. f. and Th., are small trees of the Sikkim Himalaya. The Garden Hydrangea, or Chinese Guelder Rose, so commonly cultivated as an ornamental shrub in the Hills, is *H. Hortensia,* DC.

1. H. vestita, Wall.; Hook. Fl. Ind. ii. 405; Brandis 211; Gamble 38. Vern. *Kulain,* Bhutia; *Pokuttia,* Nep.

A small deciduous tree with light brown, rather corky bark. Wood pinkish white, moderately hard; annual rings indistinct. Pores extremely small. Medullary rays very fine.

Himalaya, from Kumaun to Sikkim between 5,000 and 11,000 feet.
Weight, 45 lbs. per cubic foot.

	lbs.
E 373. Tonglo, Darjeeling, 10,000 feet	45

2. H. robusta, Hook. f. and Th.; Hook. Fl. Ind. ii. 404; Gamble 38. Vern. *Bogoti,* Nep.

A small, handsome, deciduous tree, with thin, brown, papery bark, peeling off in large flakes. Wood white, moderately hard, close-grained. Pores very small. Medullary rays of two sizes, moderately broad, short and very fine, prominent.

Eastern Himalaya, Sikkim, from 5,000 to 7,000 feet, generally as undergrowth in the oak forests.
Weight, 42 lbs. per cubic foot.

	lbs.
E 2370. Rangbúl, Darjeeling, 7,000 feet	42

2. DICHROA, Lour.

1. D. febrifuga, Lour.; Hook. Fl. Ind. ii. 406; Gamble 38. *Adamia cyanea,* Wall. t. 213. Vern. *Basak, bansúk,* Nep.; *Gebokanak,* Lepcha; *Singnamúk,* Bhutia.

An evergreen shrub, with yellow bark peeling off in flakes. Wood white, moderately hard, with small pores and moderately broad to very fine medullary rays.

Common in the forests of the Eastern Himalaya, from Nepal to Bhutan and in the Khasia Hills, above 4,000 feet.

The shoots and bark of the roots are made into a decoction and used as a febrifuge by the Nepalese. It is a very handsome shrub, with blue flowers and bright blue berries, coming up on clearings in the oak forests.

	lbs.
E 2371. Darjeeling, 7,000 feet	41

3. DEUTZIA, Thunb.

Contains 3 species *D macrantha*, Hook. f and Th. is a shrub of the Kumaun Hills above 5,500 feet

1. D. corymbosa, Brown ; Hook. Fl. Ind. ii. 406 ; Brandis 212 Vern. *Daloutchi*, *deutsch*, *bhujru*, Simla

A shrub. Outer bark yellowish grey, peeling off in long thin papery rolls, leaving the smooth, thin, greenish brown inner bark exposed. Wood, white, soft, even-grained. Pores small, very numerous. Medullary rays moderately broad, alternating with numerous very fine rays.

Himalaya, from the Sutlej to Bhutan, from 6,000 to 10,000 feet

		lbs
H 2850.	Mahasu, Simla, 7,000 feet . . .	46
H 2898	Nagkanda, Simla, 8,000 feet	...

2. D. staminea, Brown ; Hook. Fl. Ind. ii. 407 ; Brandis 212. Vern. *Muneti*, Kumaun ; *Deutsch*, Simla.

A shrub. Bark grey, soft, peeling off in small strips, but to a less degree than in *D. corymbosa.* Wood white, soft, structure similar to that of *D. corymbosa.*

Himalaya, from Kashmir to Bhutan, from 5,000 to 8,000 feet

		lbs.
H 2836 H 2819.	} Simla, 6,000 feet	43

4 PHILADELPHUS, Linn.

1. P. coronarius, Linn., Hook. Fl Ind. ii 407, Brandis 212. Vern. *Dalunchi*, *bhoj*, Simla.

A shrub with soft, light grey bark. Wood soft, white, with large pith. Pores small and very small, more numerous near the inner edge of each annual ring. Medullary rays of two classes, very fine and moderately broad. The structure of the wood of the Indian shrub is the same as that of the European shrub, the "Syringa" of gardens.

Himalaya, from Kishtwar to Sikkim, from 6,000 to 10,000 feet Often planted for ornament

		lbs
H 3038	Nagkanda, Simla, 7,000 feet . . .	41

5. RIBES, Linn.

[illegible]

Inner Himalaya. *R. desmocarpum*, Hook. f. and Th, *R luridum*, Hook. f. and Th., and *R. Griffithii*, Hook. f. and Th. are all shrubs of the Sikkim and Bhutan Himalaya.

1. R. glaciale, Wall. ; Hook. Fl. Ind. ii. 410 ; [illegible] ; [illegible] 38. Vern. *Rabhay*, Bhutia.

A small shrub with shining bark, peeling off in papery flakes. Wood white, compact, moderately hard. Pores extremely small, in narrow interrupted wavy, concentric lines. Medullary rays scanty, short, broad and very broad.

Himalaya, from Kashmir to Bhutan, between 7,000 and 11,000 feet.
Weight, 58 to 63lbs.

			lbs.
H 3021.	H 3022.	Hattu, Simla, 10,000 feet	63
H 2908.	H 2912.	Nagkanda, Simla, 9,000 feet	...
H 3025.		Matiyána, Simla, 9,000 feet	...
E 973.		Chumbi Valley, Tibet, about 10,000 feet	58

ORDER XLIII. HAMAMELIDEÆ.

Contains 7 genera of Indian trees or shrubs. *Distylium indicum*, Bth., *Sycopsis Griffithiana*, Oliv., and *Loropetalum chinense*, Oliv., are all shrubs of the Khasia Hills; while *Corylopsis himalayana*, Griff.; Hook. Fl. Ind. ii. 427, is found in the Eastern Himalaya and Khasia Hills, between 5,000 and 6,000 feet. *Liquidambar orientale*, Miller, a tree of Asia Minor, yields the fragrant resin "Storax" used in medicine.

Wood close-grained. Pores small and very small, numerous and uniformly distributed. Medullary rays numerous, fine and very fine.

1. PARROTIA, C. A. Meyer.

Besides the species described, *P. persica*, C. A. Meyer, is a shrub of the low forests on the south coast of the Caspian Sea.

1. P. Jacquemontiana, Decaisne; Hook. Fl. Ind. ii. 426; Brandis 216. Vern. *Páser, peshora, po, kilár, kirru*, Punjab.

A large deciduous shrub or small tree, with thin, grey bark. Wood light pinkish red, hard, heavy, very close-grained. Pores extremely small. Medullary rays fine, numerous.

North-West Himalaya from the Indus to the Ravi, between 2,800 and 8,500 feet.

Growth slow 12 to 16 rings per inch (*Brandis*). Weight, 56 lbs. per cubic foot. Wood highly esteemed for walking-sticks, tent pegs, charpoys and rice pestles, also for native bows for throwing pellets. But its chief use is in basket-work and in the making of bridges over the Himalayan rivers. The twigs are very tough and flexible, and are twisted together into thick ropes, often 300 feet long. The bridges consist of one large rope to walk on and two smaller side ropes, one for each hand, with smaller ropes connecting the hand ropes with the foot rope. (P 1000 was a fine specimen sent to the Paris Exhibition of 1878 from the Ravi.)

		lbs.
H 3178.	Dungagalli, Hazara, 6,000 feet	...
H 933.	Hazara, Punjab, 6,000 feet	56
H 905.	Upper Chenab, Punjab	...

2. BUCKLANDIA, R. Brown.

1. B. populnea, R. Br.; Hook. Fl. Ind. ii. 429; Kurz i. 445; Gamble 38. Vern. *Pipli*, Nep.; *Singliang*, Lepcha; *Dingdah*, Khasia.

A large evergreen tree with rough, brown bark Wood greyish brown, rough, moderately hard, close-grained, durable Pores small, Medullary rays fine, very numerous, uniform and equidistant

Eastern Himalaya Khasia Hills and hills of Martaban from 3 000 to 8,000 feet
Growth moderately fast, 6 to 7 rings per inch of radius Weight, on an average, 45 lbs per cubic foot Is very much used in Darjeeling for planking and door and window frames, and is in great demand It is a very ornamental tree with rough poplar like leaves, and thick fleshy stipules It is easily grown from seed but the young plants are rather delicate

			lbs.
E 699	Sepoydura Forest, Darjeeling	5 500 feet	41
E 2372	Raugbul „ „	7 000 „	40
E 2373	„	„ „	46

3 ALTINGIA, Noronha

1. A. excelsa, Noronha, Hook Fl Ind ii 429, Kurz i 446 Vern. *Jutili*, Ass., *Nantayop*, Burm

A lofty deciduous tree Bark smooth, light grey, exfoliating in large thin flakes Wood soft, reddish grey with lighter streaks. Annual rings marked by a narrow belt of firm wood without pores Pores small, uniform and uniformly distributed in lines between the medullary rays Medullary rays fine, equidistant, prominent on a radial section

Assam and Tenasserim
Growth moderate 6 rings per inch of radius Weight 46 lbs per cubic foot Wood used in Assam for building and ordinary domestic purposes

		lbs
F 1269	Lakhimpur Assam	46
B 2701	Brought from Tavoy by Dr Wallich in 1828 Resembles this in structure	49

Order XLIV RHIZOPHOREÆ

Contains seven Indian genera of trees chiefly coast plants and known by the general name of Mangroves They form forests binding together the mud in the estuaries of the Indus Ganges and Irrawaddi as well as along the coasts of Malabar, Arracan, Tenasserim and the Andaman Islands The Order is divided into 2 Tribes, viz,

Tribe I—Rhizophoreæ . *Rhizophora, Ceriops, Kandelia and Bruguiera*

„ II—Legnotideæ . *Carallia, Gynotroches, Weihea and Anisophyllea*

Blepharistemma corymbosum Wall [illegible]
small tree of the hills [illegible]
Ind ii 440, Kurz i [illegible]
Bull , Hook Fl Ind [illegible]
The remaining genera [illegible]

Rhizophora, Ceriops and *Bruguiera* have small pores and [illegible] fine or moderately broad rays The pores are sometimes [illegible] terrupted concentric bands The structure of *Kandelia* [illegible] *Carallia* and *Anisophyllea* differ by having [illegible] numerous very fine rays between [illegible]

1. RHIZOPHORA, Linn.

The Mangroves. Two species. *R. conjugata,* Linn.; Hook. Fl. Ind. ii. 436; Beddome xcix.; Brandis 218; Kurz i. 447 is a small tree usually associated with that here described.

1. R. mucronata, Lamk.; Hook. Fl. Ind. ii. 435; Beddome xcix.; Brandis 217; Kurz i. 447. *R. Mangle,* Roxb. Fl. Ind. ii. 459. Vern. *Bhara,* Beng.; *Kamo,* Sind; *Upoo-poma,* Tel.; *Byoo, byooma,* Burm.; *Bairada, jumuda,* And.; *Kadol,* Cingh.

A small evergreen tree. Sapwood light red; heartwood dark red, extremely hard, splits and warps a little in seasoning. Pores small, numerous, uniformly distributed; each pore surrounded by a narrow ring of soft tissue. Medullary rays fine, wavy, numerous, uniform, equidistant; the distance between the rays equal to about twice the transverse diameter of the pores.

Muddy shores and tidal creeks of India, Burma and the Andaman Islands.

Weight, 70·5 per cubic foot. The wood is good, but is rarely used. It is durable, *e.g.* B 2721 has been kept 50 years in Calcutta and is still quite sound. The bark is used for tanning, and the fruit is said to be edible. Of the quick germination of the Mangroves, Roxburgh says, "The great length of the seed gives in a very short time a young tree; for if the apex from which the root issues is only stuck a little way into a wet soil or mud, the leaves quickly unfold at the opposite end." The seeds often germinate while yet on the tree and drop as young plants into the mud. The roots also progress and form constantly fresh stems supported by the buttressed roots standing out of the mud.

		lbs.
B 2721.	Tavoy (Wallich, 1828)	69
B 502.	Andaman Islands	67
B 2240.	" " (1866)	73
B 2273.	" " "	73
No. 9.	Ceylon Collection (*Rhizophora* sp., *Caddol*)	65
No. 36.	" " (*Rhizophora* sp., *Hiri Kaddol*) . .	49

2. CERIOPS, Arn.

Contains two species. *C. Roxburghiana,* Arnott; Hook. Fl. Ind. ii. 436; Kurz i. 448. Vern. *Kapyaing,* Burm. is a large shrub of the coast forests from Chittagong to Tenasserim. Weight 46 lbs. (Wallich, No. 173, *Rhizophora decandra*).

1. C. Candolleana, Arnott; Hook. Fl. Ind. ii. 436; Beddome xcix.; Brandis 218; Kurz i. 448. Vern. *Kirrari, chauri,* Sind; *Goran,* Beng.; *Madá,* And.

A small evergreen tree, with dark red bark; wood red, hard. Pores very small. Medullary rays fine, slightly wavy, uniform and equidistant. Pores joined by fine, wavy, interrupted concentric bands.

Muddy shores and tidal creeks of India and the Andaman Islands.

Wood used in Sind for the knees of boats and other purposes; in Lower Bengal for house-posts and for firewood. The bark is used for tanning. Weight, 63 lbs. per cubic foot.

		lbs.
B 1985.	Andaman Islands (Kurz, 1866)	63

3. KANDELIA, Wight and Arn.

1. K. Rheedii, W. and A.; Hook. Fl. Ind. ii. 437; Beddome c.; Brandis 218; Kurz i. 449. Vern. *Guria,* Beng.

An evergreen shrub or small tree Wood soft, close-grained Pores very small, very numerous Medullary rays very short, moderately broad, prominently marked on a radial section, the distance between the medullary rays being many times broader than the transverse diameter of the pores.

Muddy shores and tidal creeks of Bengal Burma, and the Western Coast
Weight, 38 lbs per cubic foot Wood used only for firewood Bark used in Tavoy in dyeing red probably as a mordant

		lbs
E 407	Sundarbans . .	38

4 BRUGUIERA, Lam

Contains five species *B eriopetala* W and A *B malabarica* Arn *B caryophylloides* and *B parviflora* W and A are all trees of the shores of Malabar Bengal Arracan Tenasserim and the Andamans the last species being also found at Masulipatam on the Coromandel Coast, and in the Sundarbans

1. B gymnorhiza, Lam, Hook Fl Ind ii. 437, Brandis 210, Kurz i 450 *B Rheedii*, Bl, Beddome c *Rhizophora gymnorhiza*, Roxb Fl Ind ii 460 Vern *Kakra, kankra*, Beng, *Byoo bo*, Burm

An evergreen tree, heartwood small, red, extremely hard Pores small, oval, and subdivided, medullary rays moderately broad, fine, very numerous

Muddy shores and tidal creeks of India, Burma and the Andaman Islands.
Weight, 54 lbs per cubic foot The wood is used for firewood house posts, planks and articles of native furniture

		lbs
E 412	Sundarbans . .	54

B 2217 (62 lbs) and B 2222 (60 lbs) are specimens which were received in 1866 from the Andamans under the respective names of *Garcinia* and *Mallotus* but they are probably the wood of another species of *Bruguiera* The pores are moderate sized oval and subdivided and the medullary rays are moderately broad and fine nearly equidistant and prominent on a radial section The pores are joined by narrow, interrupted, concentric lines

5 CARALLIA, Roxb

Contains two Indian trees *C lanceæfolia* Roxb Fl Ind ii 481, Hook Fl. Ind ii 439 is an evergreen tree of the forests of Upper Tenasserim

[illegible] Ind i 439, Beddome t 193, [illegible] oxb Fl Ind ii 481, Kurz i [illegible] Nep, *Kujitekra*, Ass, *Karalli*, [illegible], *Dawata*, Cingh., *Bya*, Arracan, *Maneioga*, Burm

An evergreen tree with thin, dark-grey bark Sapwood perishable, heartwood red, very hard, durable, works and polishes well Pores moderate sized to large, often subdivided Medullary rays long, of two classes, extremely broad and fine, numerous fine rays between each pair of broad one, marked on a radial section as broad, irregular, shining plates Fine lines of soft tissue across the rays.

Eastern and Western moist zones, Eastern Himalaya, Bengal, Burma, South India and the Andamans.

Weight, according to Benson and Skinner, No. 37, 44 lbs.; A. Mendis, 42 lbs.; Brandis' Burma List, 1862, No. 106, 60lbs.; our specimens give an average of 47lbs. Benson's experiments with bars 3 feet × 1·4 inch × 1·4 inch, gave P = 797; Skinner gives P = 656.

Wood used in South Kanara for furniture and cabinet-making and in Burma for planking, furniture and rice-pounders.

			lbs.
W	743.	South Kanara	42
B	308.	Burma (1867)	47
B	816.	Burma	51
B	2530.	Burma (1862)	47
B	2210.	Andaman Islands (1866)	47
B	1500.	Burma	...
No.	19.	Ceylon Collection (marked *C. zeylanica*)	42

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2. No. 90. Adrian Mendis, Ceylon Collection, weight 51 lbs. P = 464. Vern. *Ukbeiriye,* Cingh., is probably *C. calycina,* Bth.; Thwaites Enum. 121; Hook. Fl. Ind. ii. 439. The wood is brick-red; in structure it resembles that of *C. integerrima,* but the pores are fewer, and the broad rays are narrower and at regular distances.

6. ANISOPHYLLEA, Br.

1. A. zeylanica, Bth.; Hook. Fl. Ind. ii. 442; Thw. Enum. 119; Beddome t. 195. *Tetracrypta cinnamomoides,* Gard. and Ch. Vern. *Wellipiyanne,* Cingh.

A tree. Wood greyish brown, moderately hard. Pores moderate-sized and large, filled with a white substance, prominent on a vertical section as white streaks. Medullary rays of two classes, numerous but indistinct, fine, between fewer moderately broad rays. Bars of soft texture and the same width as the rays crossing these and dividing the wood into numerous rectangular unequal figures.

		lbs.
No. 96.	Ceylon Collection	35

ORDER XLV. COMBRETACEÆ.

An Order containing 8 Indian Genera of trees, shrubs or climbers, containing some of the most important of the timber trees of the Indian forests. It is divided into 2 Tribes:—

Tribe I.—Combreteæ	*Terminalia, Calycopteris, Anogeissus, Lumnitzera, Combretum* and *Quisqualis.*
„ II.—Gyrocarpeæ	*Illigera* and *Gyrocarpus.*

Four of these genera are here described, most of the remainder contain climbing shrubs. *Lumnitzera* contains two small evergreen trees. *L. racemosa,* Willd.; Hook. Fl. Ind. ii. 452; Beddome ciii.; Brandis 221; Kurz i. 468 (*Petaloma alternifolia,* Roxb. Fl. Ind. ii. 372) Vern. *Kripa, Kirpa,* Beng.; *Baireya,* Cingh.; *Yengyé,* Burm., is a tree of the muddy creeks and tidal forests of the Sundarbans, Malabar, Arracan, Tenasserim and the Andamans, also found by Beddome at Balasore. It has a strong and durable wood used for house-posts, and in Calcutta for fuel (Roxburgh). *L. coccinea,*

W and A Hook Fl Ind u 452 (*L lit* ... mangrove swamps of Tenasser m *Com* ... cl mb ng found in the mo st zones of Indi ... *C decandrum* Roxb Fl Ind u 232 ... 460 Gamble 40 Vern *Punk pharsia* ... Lepcha, *Arikota* Tel *Thama ka nway* Burm an evergreen scandent shrub ... whitish yellow floral leaves climbing to the summits of the highest trees and found in the intermed ate and moist zones of India and Burma It has a whitish grey bark and soft l ght-brown wood having large pores and moderate sized evenly d stributed medullary rays (E 3301 Darjeeling Terai) *Quisqualis indica* Roxb Fl Ind i 427 is the Rangoon Creeper Vern *Dawaihmine* Burm a climbing shrub with red flowers indigenous in Tenasserim and cultivated in gardens in other parts of India

Illigera contains 3 spec es *I Cory adenia* Meissn Hook Fl Ind u 460 (*I appendiculata* Bl Kurz i 469) of Tenasserim and the Andamans *I Kur u* C B Clarke of Burma and the Khasia Hills and *I khasiana* C B Clarke of the Khasia Hills all sca ident shrubs

Wood moderately hard to very hard, with a distinct dark coloured heartwood in some, but not in all species Pores varying in size Medullary rays uniform, equidistant, fine or very fine very numerous, the distance between the rays less than the diameter of the pores The wood of *Gyrocarpus* is anomalous

1 TERMINALIA, Linn

Cont ... valuable timber as ... per cubic foot

Wood moderately hard to very hard A distinct, dark coloured, very hard heartwood in *T tomentosa, Arjuna, myriocarpa*, and *paniculata*, dark coloured, but not well defined wood near the centre in *T Chebula* and *citrina*, no heartwood in the remaining species Pores moderate-sized to large, prominent on a vertical section Medullary rays fine, numerous, uniform and equidistant, the distance between two rays being less than the transverse diameter of the pores Concentric bands of soft texture continuous in *T belerica, bi alata, alata* and *Catappa*, interrupted and sometimes wanting in the other species

1 T belerica, Roxb Fl Ind u 431, Hook Fl Ind u 445, Beddome t 19, Brandis 222, Kurz i 455, Gamble 39 Vern *Bibela, beleyleh*, Pers, *Bahera, bhaira, behari*, Hind, *Bohera*, Beng, *Baheri*, Rajbanshi, *Kanom*, Lepcha, *Chirore*, Garo, *Hulluck, bauri*, Ass, *Thara*, Uriya, *Tani, kattu elupay*, Tam, *Tani, tandi, toandi, thandra*, Tel, ... Kan, *Bherda, bahera*, Mar, *Balra*, ... *Tahaka, taka, banjir*, Gondi, *Lehera* ... gh, *Titsein*, Burm

A large deciduous tree, bark ½ inch thick, bluish grey, with numerous fine vertical cracks Wood yellowish grey, hard, no heartwood, not durable, readily attacked by insects, annual rings indistinct Pores of two sizes ... irregular, ... contain ... pores Fin ... e distinct ...

Eastern and Western moist zones, Eastern Himalaya, Bengal, Burma, South India and the Andamans.

Weight, according to Benson and Skinner, No. 37, 44 lbs; A. Mendis, 42 lbs.; Brandis' Burma List, 1862, No. 106, 60lbs.; our specimens give an average of 47lbs. Benson's experiments with bars 3 feet × 1·4 inch × 1·4 inch, gave P = 797; Skinner gives P = 656.

Wood used in South Kanara for furniture and cabinet-making and in Burma for planking, furniture and rice-pounders.

			lbs.
W	743.	South Kanara	42
B	308.	Burma (1867)	47
B	816.	Burma	51
B	2530.	Burma (1862)	47
B	2210.	Andaman Islands (1866)	47
B	1500.	Burma	...
No.	19.	Ceylon Collection (marked *C. zeylanica*)	42

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2. No. 90. Adrian Mendis, Ceylon Collection, weight 51 lbs. P = 464. Vern. *Ukbeiriye*, Cingh., is probably *C. calycina*, Bth.; Thwaites Enum. 121; Hook. Fl. Ind. ii. 439. The wood is brick-red; in structure it resembles that of *C. integerrima*, but the pores are fewer, and the broad rays are narrower and at regular distances.

6. ANISOPHYLLEA, Br.

1. A. zeylanica, Bth.; Hook. Fl. Ind. ii. 442; Thw. Enum. 119; Beddome t. 195. *Tetracrypta cinnamomoides*, Gard. and Ch. Vern. *Wellipiyanne*, Cingh.

A tree. Wood greyish brown, moderately hard. Pores moderate-sized and large, filled with a white substance, prominent on a vertical section as white streaks. Medullary rays of two classes, numerous but indistinct, fine, between fewer moderately broad rays. Bars of soft texture and the same width as the rays crossing these and dividing the wood into numerous rectangular unequal figures.

	lbs.
No. 96. Ceylon Collection	35

ORDER XLV. COMBRETACEÆ.

An Order containing 8 Indian Genera of trees, shrubs or climbers, containing some of the most important of the timber trees of the Indian forests. It is divided into 2 Tribes:—

Tribe I.—Combreteæ	*Terminalia, Calycopteris, Anogeissus, Lumnitzera, Combretum* and *Quisqualis.*
„ II.—Gyrocarpeæ	*Illigera* and *Gyrocarpus.*

Four of these genera are here described, most of the remainder contain climbing shrubs. *Lumnitzera* contains two small evergreen trees. *L. racemosa*, Willd.; Hook. Fl. Ind. ii. 452; Beddome ciii.; Brandis 221; Kurz i. 468 (*Petaloma alternifolia*, Roxb. Fl. Ind. ii. 372) Vern. *Kripa, Kirpa*, Beng.; *Baireya*, Cingh.; *Yengyé*, Burm., is a tree of the muddy creeks and tidal forests of the Sundarbans, Malabar, Arracan, Tenasserim and the Andamans, also found by Beddome at Balasore. It has a strong and durable wood used for house-posts, and in Calcutta for fuel (Roxburgh). *L. coccinea*,

W and A , Hook Fl Ind ii 452 (*L littorea*, Voigt, Kurz i 469) is a small tree of the mangrove swamps of Tenasserim *Combretum* comprises 16 large shrubs generally climbing found in the moist zones of India and Burma of which the mo t common is *C decandrum* Roxb Fl Ind ii 232, Hook Fl Ind ii 452 Brandis 221, Kurz i 460 Gamble 40 Vern *Punk, pharsia, dhobela* Hind , *Kalilara* Nep , *Pindik*, , [illegible] an evergreen scandent shrub with [illegible] of the highest trees and found in [illegible] It has a whitish grey bark and soft light-brown wood [illegible] moderate sized evenly d stributed medullary rays (E 3301 Darjeeling Terai) *Quisqualis indica* Roxb Fl Ind ii 427 [illegible] Vern *Dawaihmine*, Burm a climbing shrub with red [illegible] arts of India [illegible] Fl Ind ii 460 [illegible] , *I Kur* ii C B [illegible] ke of the Khasia Hills all scandent shrubs

Wood moderately hard to very hard, with a distinct dark-coloured heartwood in some, but not in all species Pores varying in size Medullary rays uniform, equidistant, fine or very fine, very numerous, the distance between the rays less than the diameter of the pores The wood of *Gyrocarpus* is anomalous

1 TERMINALIA, Linn

Contains about 12 Indian trees, mostly of very large size and furnishing valuable timber as well as other products *T procera*, Roxb Fl Ind ii 429 Hook Fl Ind ii 444 Kurz i 454 is a lofty tree of the Andaman Islands *T fœtidissima* Griff, Hook Fl Ind ii 445, is a tree of Mergui *T pyrifolia* Kurz i 457, Hook Fl Ind ii 448 Vern *Leinben*, Burm , is a Burmese deciduous tree, with wood weighing 39 lbs per cubic foot

Wood moderately hard to very hard A distinct, dark-coloured, very hard heartwood in *T tomentosa*, *Arjuna*, *myriocarpa*, and *paniculata* , dark-coloured, but not well-defined wood near the centre in *T Chebula* and *citrina* , no heartwood in the remaining species Pores moderate-sized to large, prominent on a vertical section Medullary rays fine, numerous, uniform and equidistant, the distance between two rays being less than the transverse diameter of the pores Concentric bands of soft texture continuous in *T belerica*, *bi-alata*, *alata* and *Catappa* , interrupted and sometimes wanting in the other species.

1. T. belerica, Roxb Fl Ind. ii 431, Hook Fl Ind ii 445, Beddome t 19, Brandis 222, Kurz i 455, Gamble 39 Vern *Babela, beleyleh*, Pers , *Bahera, bhaira, behara*, Hind , *Bohera*, Beng , *Baheri*, Rajbanshi, *Kanom*, Lepcha, *Chirorœ*, Gáro, *Hulluch*, *bauri*, Ass , *Thara*, Uriya, *Tani*, *kattu elupay*, Tam , *Tani*, *tandi*, *toandi*, *thandra*, [illegible] Santi Kan , *Bherda*, *bahera*, Mar , [illegible] *Tahaka*, *tala*, *banjir*, Gondi, [illegible] gh , *Thitsein*, Burm

A large deciduous tree, bark ½ inch thick, bluish grey, with numerous fine vertical cracks Wood yellowish grey, hard, no heartwood, not durable, readily attacked by insects, annual rings indistinct *Pores of two sizes, large and small, the large ones frequently subdivided, joined by irregular, wavy, concentric bands of softer tissue, which contain the small pores* Fine, uniform and equidistant medullary rays are distinctly [illegible]

in the harder and darker portions between the bands, and on the radial section.

This wood distantly resembles in structure that of *Ougeinia dalbergioides*, but the bands of soft tissue are more continuous, and the medullary rays are less prominent.

Sub-Himalayan tract from near the Indus eastwards, forests of India and Burma. Growth moderate to rapid, 3 to 7 rings per inch of radius. Weight, according to Kyd's Assam experiments, 43 lbs. per cubic foot; Central Provinces List, 39 lbs.; Brandis' Burma List, 1862, No. 47, 40 lbs.; the average of our specimens gives 48 lbs. Kyd gives P = 378. The wood is used for planking, packing cases, canoes, and in the North-Western Provinces for house-building after steeping in water which has the effect of making it more durable. In the Central Provinces it is used for plough shafts and carts when *bijasál* is not available. In South India it is used for packing-cases, coffee-boxes, catamarans, and grain measures. The fruit is one of the myrabolans, and is exported to Europe to be used in dyeing cloth and leather and in tanning. Native ink is made of it, and it is used in medicine as a purgative and for other purposes. The kernels of the fruit are eaten, but are said to produce intoxication if eaten in excess (Hunter's Statistical Account of Bengal, xvi. p. 51), and an oil is obtained from them which is used for the hair. The fruit is eaten by monkeys, deer, goats, sheep, and cattle. The tree gives a copious gum, which does not seem to be of much use. The leaves according to the Indore Forest Report of 1876-77 have been used as an antiseptic to impregnate sleepers of *Salei* (see under *Boswellia thurifera*, p. 66), which are said, after soaking for five months in a tank filled with Bahera leaves and water, to have been rendered durable.

		lbs.
P 1190.	Madhopúr, Punjab	35
O 534.	Dehra Dún	58
O 2995.	Garhwal (1874)	59
O 349.	Gorakhpur (1868)	52
C 176.	Mandla, Central Provinces (1870)	...
C 1125.	Ahiri Reserve, Central Provinces	42
C 2737.	Moharli Reserve, Central Provinces	44
C 2773.	Melghát, Berar	...
E 663.	Bamunpokri, Darjeeling Terai	46
W 1188.	South Kanara	44
B 2532.	Burma (1862)	...
No. 53.	Salem Collection (marked *Wrightia antidysenterica*)	52

2. **T. Chebula,** Retzius; Hook. Fl. Ind. ii. 446; Roxb. Fl. Ind. ii. 433; Beddome t. 27; Brandis 223; Kurz i. 456; Gamble 39. Vern. *Harra, har, harara,* Hind.; *Hilikha,* Ass.; *Haritáki,* Beng.; *Silim,* Lepcha; *Karedha,* Uriya; *Halra, harla,* Dekkan; *Karka, hir, harro, mahoka,* Gondi; *Kadakai,* Tam.; *Karaka, kadukar,* Tel.; *Heerda,* Kan., Mar.; *Alalé,* Mysore; *Kajo,* Magh; *Pangah,* Burm.; *Aalu,* Cingh.

A large deciduous tree. Bark ¼ inch thick, dark brown, with numerous generally shallow vertical cracks. Wood very hard, brownish grey, with a greenish or yellowish tinge, fairly smooth and close-grained, fairly durable, seasons well. No regular heartwood, but frequently irregular masses of dark purple wood near the centre. Annual rings indistinct. Pores small and moderate-sized, uniformly distributed, often subdivided; each pore or group of pores surrounded by a narrow ring of soft tissue. Medullary rays very fine, uniform, equidistant, very numerous, distinctly visible on a radial section. The structure of the wood differs from that of *T. tomentosa*, chiefly by smaller pores.

Sub-Himalayan tract from the Sutlej eastwards, ascending to 5,000 feet; Bengal, Assam, Chittagong, Central and South India.

Growth moderate 6 to 10 rings per inch of radius The weight and transverse gth have been determined by the following experiments —

me of person con ing exper ment	Year	Wood whence procured	N mber of ex peri ments	Size of bar	We ght	Val e of P	
				Ft. In In			
son		Burma		3 × 1 4 × 1 4	68	1033	
Thompson	1868	Satpuras			63		
nd s	1864	Ind a	3	3 × 1 × 1	66	1090	
No 48	186?	B rma			53		
nner I o 1?9	186?			Var ous	60	1033	
No 126	1872	So th Ind a			54	6 5	
llich		India		\	4*		
ythies	1878	See list below	10		63		
yd	1831	oalpara	1	2 × 1 × 1	56	830	(T *Hilika*

The wood takes a good polish and is fairly durable it is used for furniture carts gricultural implements and house building Beddome says it is cross-grained and It is being tried for sleepers in Bengal The bark is used for tan wh ch are of a rather better from Bombay to Europe t the Forest Department m it alone In 1877 78 erage a lakh The u r pe *engı angıkar Kalchar,* and with iron-clay give

Hind *Kokı* Nep) ıgs wh ch are also used for a good sort of ink ink and in dyeing and tanning The kernel giv ı arent oil

		lbs.
		56
O 213	Garhwal (1868)	66
O 528	Dehra D n	60
O 336	Gorakl pur (1868)	57
C 181	Man lla Central Provinces	66
C 1159	Al ırı Reserve Central Provinces (1870)	69
C 812	Ba ragarl Reserve Berar	60
C 1247	Gumsur Madras	67
E 671	Bamunpokrı Darjeeling Teraı	63
I 2374	"	
D 10?4	North Arcot Madras	62
No 50	Salem Collection	

3 **T. citrina**, Roxb Fl Ind ıı 435, Hool Fl Ind ıı 446, Kurz ı 456 Vern *Harıtakı*, Beng , *Hılıka, ılikka*, Ass , *Hortuckı*, Cachar , *Kyoo*, Burm

A large deciduous tree Bark light grey, exfoliating with few large irregular flakes Wood grey, darker towards the centre, hard Structure similar to that of *T Chebula*

Andamans cub c foot Used for planks re p ant

		lbs
		49
E 2198	Nowgong Assam	—
B 1982	Andaman Islands (Kurz 1866)	

4. **T. Catappa,** Linn.; Hook. Fl. Ind. ii. 444; Roxb. Fl. Ind. ii. 430; Beddome t. 20; Kurz i. 454. The Indian Almond. Vern. *Badam*, Beng.; *Taree*, Kan.; *Nat vadom*, Tam.; *Vedam*, Tel.; *Adamarram*, Mal.; *Catappa*, Malay.

A large deciduous tree, with whorled branches, leaves turning red in the cold season. Wood red, with lighter-coloured sapwood, hard. Pores moderate-sized, scanty, joined by wavy, short and concentric bands of soft texture. Medullary rays fine.

Beach forests of the Andaman Islands; cultivated in most parts of India and Burma.
Weight, according to Skinner, No. 125, 32 lbs. per cubic foot. P = 470. Wallich also gives 32, while our specimen gives 41 lbs. Beddome says the wood is used for various purposes in Madras. The kernels of the nuts are eaten at dessert; they are remarkable for the spiral folds of the cotyledons; the bark and leaves give a black dye. It is one of the trees on the leaves of which the "Tasar" or "Katkura" silkworm (*Antheræa Paphia*) is fed.

		lbs.
E 3005.	Calcutta	...
B 1983.	Andaman Islands (Kurz, 1866)	41

5. **T. paniculata,** W. and A.; Hook. Fl. Ind. ii. 448; Beddome t. 20; Brandis 226. *Pentaptera paniculata*, Roxb. Fl. Ind. ii. 442. Vern. *Pe-karakai*, Tam.; *Neemeeri*, Tel.; *Kinjal, kindal*, Mar.; *Honal, huluvá, hulvé*, Kan.; *Poo mardá, pillai mardá*, Anamalais.

A large deciduous tree. Wood grey, with dark heartwood, very hard. Pores large and moderate-sized, oval, numerous. Medullary rays very fine, uniform and equidistant, wavy, very numerous; the transverse diameter of the pores many times larger than the distance between two medullary rays. Pores surrounded by faintly marked patches of soft tissue, often arranged in oblique and wavy lines.

Western moist zone; forests of the western coast from Bombay southwards.
Weight, 61 lbs. per cubic foot. Wood valuable, though not quite as good as that of *T. tomentosa*. It is improved by being kept under water. It is fairly durable. It makes good planking and is used for the handles of ploughs in Ratnaghiri.

		lbs.
W 1221.	North Kanara	57
D 1280.	Anamalai Hills	65

6. **T. bialata,** Wall.; Hook. Fl. Ind. ii. 449; Kurz i. 456. *Pentaptera bialata*, Roxb. Fl. Ind. ii. 441. Vern. *Leinben*, Burm.

A large deciduous tree. Wood grey, beautifully mottled, moderately hard. Structure the same as that of *T. belerica*.

Burma and the Andaman Islands.
Weight, Brandis' Burma List, 1862, No. 49, gives 39; our specimens give 48 lbs. per cubic foot. Skinner No. 124 gives weight 64 lbs., and P = 1042, but there may have been some mistake.

		lbs.
B 1417.	Tharrawaddi, Burma	48

7. **T. tomentosa,** W. and A.; Hook. Fl. Ind. ii. 447; Beddome t. 17; Brandis 225; Kurz i. 458; Gamble 39. *Pentaptera crenulata, coriacea* and *tomentosa*, Roxb. Fl. Ind. ii. 438-440. Vern. *Saj, sein, asan, assain, assaina, asna, sadri*, Hind.; *Piasal, usan*, Beng.; *Jhau*, Rajbanshi; *Amari*, Ass.; *Taksor*, Lepcha; *Saháju, kala saháju*, Uriya; *Barsaj*, Bijeragogarh; *Karra marda, karú marúthú, anemúi*, Tam.; *Maddi, halla naddi, nella-madu*, Tel.; *Matti, kari matti, banapu*, Kan.

Murada, kali maruthai, Arcot; *Karkaya, sadora, holda, dudi maddi*, Hyderabad; *Ain, madat, yén*, Mar.; *Saja*, Baigas; *Maru*, Gondi; *Madge*, Bhil; *Toukkyan*, Burm.; *Chouchong*, Taleing; *Kumbuk*, Cingh.

A large deciduous tree. Bark one inch thick, grey to black, with long, broad, deep, longitudinal fissures, and short, shallow, transverse cracks; inner substance red when fresh. Sapwood reddish white, heartwood dark brown, hard, beautifully variegated with streaks of darker colour, shewing on a radial section as dark streaks which are generally wavy or undulating, durable, seasons well and takes a good polish. Numerous concentric wavy lines unequally distributed. Pores moderate sized and large, uniformly distributed, each pore enclosed in an irregularly shaped and generally elongated patch of soft tissue, these patches are often arranged in concentric lines and frequently joined by thin, white, wavy, concentric bands. Medullary rays not distinct, very fine, numerous, uniform, equidistant, often wavy, the transverse diameter of the pores many times larger than the distance between the rays. In the sapwood the patches of soft tissue enclosing the pores are more distinct, and the medullary rays more prominent.

[illegible] 4 000 feet in places [illegible] the following experiments —

Experiment by whom conducted.	Year	Wood whence procured	Number of experiments	Size of scantling	Weight	Value of P
				Ft In In		
Puckle	18?9	Mysore	3	2 × 1 × 1	56	1 010
(List)	1863				57	...
(List) Paris Exhibition	186?	Central Provinces			60	
P. Thompson	1860	"			55	...
Skinner *No 1?7	1862	South India		Various	60	800
†No 1?8	1862			"	55	8?0
Baker	18?0	Jubbulpore	4	7 × 2 × 2	62	6?7
French	1861	South India at Erode	...	13 × 1 × 1	59	8?2
Balfour		...	3	7 × 2 × 2	60	6?5
Benson	...	Burma		3 × 1 4 × 1 4	71	1,?01
Brandis No 60	186?		...		65	...
	1864		3	3 × 1 × 1	56	903
Smythies	18?8	See list below	16		61	

* T coriacea, Skinner p 149. † T glabra, Skinner p 150.

Its durability is uncertain; in Burma the heartwood decays rapidly; in North India [illegible]

must not be considered as good as if the sleepers had been [illegible] In 1876, 725 [illegible] were out in the [illegible] forests, [illegible] the Northern Bengal State Railway, the result of [illegible] The [illegible] The bark is used for tanning and dyeing black, and the ashes of the bark give a kind of lime which is eaten by the natives with betel leaf. The "tussur" silkworm (*Antheraea* [illegible]) feeds on its leaves, and lac is occasionally gathered from its branches. It gives [illegible]

O 257.	Gorakhpur (1868)	[illegible]
O 2[illegible]	" (1879)	[illegible]
O 875.	Kumaon Bhabar	[illegible]
O 282.	Oudh	[illegible]
O 284.	Oudh	[illegible]
O [illegible]	Oudh	[illegible]
C [illegible]	[illegible] (1868)	[illegible]
C 171.	Mandla, Central Provinces (1873)	[illegible]
C [illegible]	Seoni, Central Provinces	[illegible]
C 1104.	[illegible] Reserve, Central Provinces	[illegible]
C [illegible]	[illegible] Reserve, Central Provinces [illegible]	[illegible]
C 1281.	[illegible], Madras	[illegible]
E [illegible]	[illegible], Darjeeling Terai	[illegible]
E [illegible]	[illegible], Darjeeling Terai	[illegible]
W [illegible]	North Kanara	[illegible]
B [illegible]	North Arcot	[illegible]
B [illegible]	North Arcot	[illegible]
B [illegible]	Anamalai Hills	[illegible]
B [illegible]	Burma (1869)	[illegible]

Terminalia [illegible]

6. T. Arjuna, [illegible]

[illegible]

[illegible]

[illegible]

is used for carts agricultural implements boats and for building It gives a brown transparent gum The bark is used as a tonic and to heal wounds

			lbs
C 179	Mandla Central Provinces (1870)	.	54
C 1111	Abiri Reserve Central Provinces		60
C 2760	Moharli Reserve Central Provinces		.

9 T **myriocarpa**, Heurck and Muell Arg , Hook Fl Ind ii 447, Kurz i 455 *T myriopteron*, Kurz, Gamble 39 Vern *Panisaj*, Nep , *Sungloch*, Lepcha , *Hollock*, Ass

A very large evergreen tree Bark greyish brown, rough, peeling off in vertical flakes Sapwood white, not broad , heartwood brown, beautifully mottled with dark streaks Structure that of *T tomentosa*

Eastern Himalaya and Assam in Sikkim up to 5 000 feet

Growth moderate 6 to 7 rings per inch of radius Weight 51 to 54 lbs per cubic foot Used for building and tea boxes also for charcoal

		lbs
E 500	Khookloong Forest Darjeeling Terai	54
E 2376	Bamunpokri Darjeeling Terai	51

E 2315 cut from a log of wood which had been lying for many years in the bed of the Chauwa Jhora near Sivoke in the Darjeeling Terai and is now perfectly black may be this species.

2 CALICOPTERIS, Lamck

Contains two climbing shrubs *C nutans* Kurz i 463 (*Getonia nutans* Roxb Fl Ind ii 428) Vern *Kywotnay nway* Burm is a large scandent shrub of Burma

1 **C. floribunda**, Lam , Hook Fl Ind ii 449, Brandis 220 *Getonia floribunda*, Roxb Fl Ind ii 428 Vern *Kokoranj*, C P , *Bandi murududu*, Tel , *Marsada boli*, Mysore

[illegible] Wood yellowish white, moderately hard Pore[illegible] Medullary rays very fine, very numerous, [illegible]e distance between the rays being less than [illegible] the pores Numerous broad medullary patches of soft, pith-like texture.

Central and Southern India

Weight 45 lbs per cubic foot

		lbs
C 2755	Moharli Reserve Central Provinces	[illegible]

3 ANOGEISSUS, Wall

Contains 4 Indian trees *A phillyreæfolia* Heurck and [illegible] Ind ii 451 is a small tree of Burma

Pores small Medullary rays fine, unif[illegible] tant, the transverse diameter of the pores equal [illegible] the distance between the rays

1 **A. latifolia**, Wall , Hook Fl Ind [illegible] Brandis 227 *Conocarpus latifolia* Roxb Fl [illegible] *dhauri, dhau, dhawa, dhaula, d[illegible]* [illegible] *dh[illegible]ukra, dhokri, d[illegible]u*, Rajputana, *K[illegible]* [illegible] *veckali*, Tam , *Chir[illegible]*, [illegible] *Dohu, dhobu*, Uriya, *D[illegible]ori, d[illegible]ra, d[illegible]* [illegible]

Dinduga, dindlu, bejalu, dindal, Kan.; *Arma, yerma,* Gondi; *Dhawa,* Baigao; *Dhaundak,* Bhíl; *Dhaura,* Kurku; *Daawoo,* Cingh.

A large tree with smooth, whitish grey bark, $\frac{1}{6}$ inch thick, with shallow, irregular depressions, caused by exfoliation. Wood grey, hard, shining, smooth, with a small purplish brown, irregularly shaped, extremely hard heartwood. Sapwood in young trees and branches yellow. Annual rings marked by darker lines. Pores small, very numerous, uniformly distributed, often subdivided. Medullary rays very fine, extremely numerous, uniform, equidistant, distinctly visible on a radial section, often giving the wood a mottled appearance. The transverse diameter of the pores equal to the distance between the medullary rays.

Sub-Himalayan tract from the Ravi eastwards ascending to 3,000 feet, Central and South India.

Growth moderate, 7 rings per inch of radius. Weight, 65 lbs. (Puckle and Skinner, No. 51); 61 (R. Thompson); 64 (Central Provinces List); 75 to 80 lbs. when green; our specimens give an average of 62 lbs. Skinner gives P = 1220, while French of the Madras Railway gives 752 and Puckle from 3 experiments with bars 2′ × 1″ × 1″, 870. The wood is highly valued on account of its great strength and toughness, but it splits in seasoning and unless kept dry is not very durable. It is used for axe handles, poles for carrying loads, axles in the construction of furniture, agricultural implements and in ship-building. It has been recommended for sleepers. Out of 18 sleepers which had lain 7 to 8 years on the Mysore State Railway there were found, when taken up, 4 good, 10 still serviceable and 4 bad. It gives a good fuel and an excellent charcoal. It gives a gum which is extensively sold for use in cloth-printing. The leaves are used for tanning.

			lbs.
P	446.	Ajmere	...
O	233.	Garhwal (1868)	68
O	2997.	„ (1874)	64
O	531.	Dehra Dún	62
O	394.	Oudh	62
C	2776.	Melghát, Berar	59
C	190.	Mandla, Central Provinces (1870)	58
C	1121.	Ahiri Reserve, Central Provinces	65
C	2744.	Moharli Reserve, Central Provinces	55
C	1244.	Gumsúr, Madras	66
D	1282.	Anamalai Hills, Madras	56
No.	21.	Salem Collection	69

2. A. acuminata, Wall.; Hook. Fl. Ind. ii. 450; Beddome t. 16; Brandis 228; Kurz i. 466. *Conocárpus acuminata,* Roxb. Fl. Ind. ii. 443. Vern. *Chakwa,* Beng.; *Panchi, pasi,* Uriya; *Numma,* Tam.; *Páchi mánu, panchman, paunchinan, bucha karum, pashi, pansi,* Tel.; *Phás,* Mar.; *Saikamehhia, thekri napay,* Magh; *Yung, sehoong,* Arracan; *Yungben,* Burm.; *Phassi,* Mar.

A large deciduous tree. Bark $\frac{1}{2}$ inch thick, dark grey, rough, granulated when old. Wood grey, sometimes yellowish grey with a greenish tinge, shining, in structure moderately hard, resembling that of *Anogeissus latifolia,* but the pores considerably larger and the transverse diameter of the pores greater than the distance between two rays.

Chanda District, South India, Chittagong and Burma.

Weight, according to Skinner, No. 50, 59 lbs., 53 lbs. (Brandis' Burma List, 1862, No. 51). Our specimen gave 57 lbs. Skinner gives P = 880. The wood warps and cracks in seasoning, and is not very durable especially where exposed to water. Used in Burma and in Madras for building. Roxburgh says it is durable if kept dry, but soon decays if exposed to wet. The leaves are used for tanning in Gumsúr.

		lbs
C 1143	Ahiri Reserve Central Provinces	67
B 3204	Burma (1862)	
B 3095	Prome, Burma	

The Central Provinces and Burma woods correspond exactly in structure

3 A. pendula, Edgw, Hook Fl Ind ii 451, Brandis 229 *Conocarpus myrtifolia*, Wall Vern *Dhau, dhaukra, kala dhaukra*, Meywar, *Kardahi*, Hind

A small gregarious tree with pendulous branches, leaves turning copper-coloured in the cold season Wood hard, yellowish white, with a small, irregular, blackish-purple heartwood Annual rings indistinct Pores very small and extremely small, often in groups between the very fine, very numerous, uniform and equidistant medullary rays

Arid and northern dry zones, Rajputana Malwa Plateau as far as the Nerbudda in Nimar, Mandla District on the Nerbudda (?)

Cunningham's 5 experiments made at Gwalior with bars 2 × 1″ × 1″, give the weight at 59 lbs per cubic foot and P = 837 the average of the 5 experiments which ranged from 697 to 1 034 It coppices well but the wood is not in general use

P 454 Ajmere

4 GYROCARPUS, Jacq

1. G. Jacquini, Roxb Fl Ind i 445, Hook Fl Ind ii 461, Beddome t 196, Kurz i 470 Vern. *Zaitun*, Hind, *Tanaku, kumar pulki*, Tel, *Pinlay thitkouk*, Burm

A deciduous tree Wood grey, soft Pores large and moderate sized, often subdivided, uniformly distributed, well marked on a longitudinal section Medullary rays very short, moderately broad, the distance between them greater than the transverse diameter of the pores

South India Tenasserim and Andaman Islands

Weight, 23 lbs per cubic foot Wood used in South India to make boxes and toys It is preferred to all others for catamarans The seeds are made into rosaries and necklaces

		lbs
D 1079	North Arcot, Madras	23

Order XLVI MYRTACEÆ

An Order containing 11 Indian Genera including *Eucalyptus* some species of which are now almost naturalised The Indian Genera belong to 3 Tribes —

Tribe I — Leptospermeæ	*Melaleuca Eucalyptus* and *Tristania*
„ II — Myrteæ	*Psidium Rhodomyrtus Rhodamnia Decaspermum* and *Eugenia*
„ III — Lecythideæ	*Barringtonia, Careya* and *Planchonia*

of Ten[illegible] Vern [illegible] g [illegible]

Rhodomyrtus tomentosa DC Hook Fl Ind ii 469, [illegible] *Thaontly*, Burghers, is a large shrub abundant in the [illegible]

Nilgiris, said by Beddome to have a white soft wood, with a pink heartwood and to be used for turning. Its fruit is edible, and is made into preserves. *Rhodamnia trinervia*, Bl., Hook. Fl. Ind. ii. 468; Kurz i. 475, is a shrub of Tenasserim; while *Decaspermum paniculatum*, Kurz i. 475; Hook. Fl. Ind. ii. 470, is an evergreen tree which is said by Kurz to spring up on deserted hill toungyas at 3,000 to 4,000 feet elevation in Martaban and Tenasserim. The Myrtle (*Myrtus communis*, Linn.) is cultivated in India.

The flower-buds of *Caryophyllus aromaticus*, Linn., of the Moluccas give the Cloves of commerce, and *Pimenta officinalis*, Ldl., of the West Indies, Pimento or Allspice.

Pores small and moderate-sized. Medullary rays numerous, fine, rarely broad. Concentric bands of soft tissue not common.

1. MELALEUCA, Linn.

1. M. Leucadendron, Linn.; Hook. Fl. Ind. ii. 465; Kurz i. 472. *M Cajuputi*, Roxb. Fl. Ind. iii. 394.

An evergreen tree. Bark white, thick, spongy, peeling off in papery flakes. Wood reddish brown, hard. Pores moderate-sized, scanty. Medullary rays very fine, extremely numerous.

Tenasserim.

The leaves give the Cajuput oil of commerce, which is largely exported from the Malay Archipelago and is used in medicine as a stimulant and diaphoretic.

O 3270. Saharanpur Gardens.

2. EUCALYPTUS, L'Her.

Numerous species of this genus of trees have been introduced into India from Australia, where they have the general name of "Gum trees;" but their success has been very variable. *E. Globulus*, Lab., here described, and *E. obliqua*, L'Her., have been almost completely naturalised on the Nilgiris. The latter species is known by the name of "Stringy Bark," and in Victoria, South Australia and Tasmania is an immense tree, reaching occasionally to 300 feet in height, with a girth of 100 feet (Brandis, 231). It has also been tried at Changa Manga, but has failed at Lucknow. At Lucknow, however, the cultivation of *E. saligna*, Smith, "The White or Grey Gum" of New South Wales, has succeeded well in the Wingfield Park, and that of *E. rostrata*, Schlect, in the Horticultural Gardens. At Changa Manga Plantation several species have been found to grow well, and at Abbottabad *E. Globulus*, Lab., *E. Stuartiana*, F. Müll., *E. tereticornis*, Sm., *E. viminalis*, Lab., and *E. leucoxylon*, F. Müll., have succeeded admirably. The seeds of numerous other species have been sown at different places in the plains and valleys of the Punjab, as well as at the Botanic Gardens at Saharanpur, the Horticultural Gardens at Lahore and Lucknow, and many places in the Central Provinces, Berar and Central India; and there is no doubt that when it has been determined which species are most suited to the very different climates and soils of the various parts of India, the cultivation of the species of Eucalyptus which possess so many valuable properties, such as their quick growth, useful timber, and the numerous products to be obtained from their leaves and bark, their cultivation should be encouraged and their growth fostered.

1. E. Globulus, Labillardière; Brandis 231. The Blue Gum. Vern. *Kurpoora maram*, Madras.

A lofty tree with fibrous deciduous outer bark. In Australia the wood is brown, hard, tough, durable. The wood of a tree grown on the Nilgiris, 18 years old and 95 feet high, is grey, with darker streaks and moderately hard. Pores moderate-sized, round, frequently arranged in groups or in radial or oblique lines. Medullary rays fine, very numerous, the intervals between the rays smaller than the diameter of

the pores Pores marked on a longitudinal section, and medullary rays visible as narrow bands on a radial section.

Gregarious in Victoria and the south of Tasmania Introduced on the Nilgiris, and now completely naturalised

Of the *Eucalyptus Globulus* several successful plantations have been established on the Nilgiri Hills There are 22 plantations in all but some of them are exclusively of Wattles or Australian *Acacia*, others contain only a small proportion of *Eucalyptus*, while others have not been successful owing to bad locality or other reasons The chief good plantations are—

Near Ootacamund—

1 Aramby	38 acres	planted	1863-65
2 Governor s Shola	80 ,	,	1870 72
(part, however, is *Acacia Melanoxylon*)			
3 Norwood	26 „	„	1872 73
4 Cally .	14 „	„	1870
5 Arnikal	11 „	„	1873
6 Bail ie	33 „	„	1874
Near Wellington—			
7 Newman	35 ,	„	1870 71
8 Old Forest	200 „		1872 73

or, including smaller ones, about 500 acres altogether Colonel Beddome in his Report of 12th June 1876, from which the above is taken, says that in Aramby the growth is very unequal, some being 30 to 40 inches in circumference, others only 3 to 4 inches, that about 504 were then found per acre Measurements of 15 of the largest trees, made by Mr Gass, gave an average girth of 34 inches height 85 feet,

amount of material per acre at different ages

The *Eucalyptus Globulus* has been tried at [illegible]
on account of the reports that it would prev[illegible]
in reclaiming marshy land Whatever may be t[illegible]
tree has almost universally fail d in the plai[illegible]
succeeded in a few localities At Simla whether from frost or for what reason,

perhaps the larg st of the species usually tried in India, the seed if good germinates well usually, and the plants at once begin to grow fast, but they are very tender of transplanting so that that operation has to be very carefully [illegible]

the transplanting of Eucalyptus, the following memorandum was drawn up by Colonel H. R. Morgan, Deputy Conservator of Forests, Madras :—

"The seed, which should be procured in January or February, should be placed in beds in rows 6 inches apart. When the plants are 6 inches high, they should be taken up and placed 6 inches apart in beds; the roots should be shortened to 4 inches. When 3 feet in height, the plants are taken up with a ball of earth round their roots, moss is bound tightly round the ball, and the plants are left in beds well earthed up about the roots, and watered till the young rootlets show through. They may then be put out. April is the best month for planting, as the plants are then able to make strong roots before the *monsoon.* When moss is not available, bamboo pots may be used, taking care to keep the large end of the joint for the top of the pot; the hole at the bottom to be plugged with grass. The plants should be placed in the pots when 8 inches in height, and left till they are 2 feet high and the roots show through; then thrust the roots through, and the plant comes out with a ball of earth attached to the roots. Pits should be 18 inches cube."

Weight, Mr. Newbery's "Descriptive Catalogue of the Specimens in the Museum at Melbourne, illustrating the economic woods of Victoria," gives 44 lbs. on an average; our specimen gave 43 lbs. The weight and value of P., calculated from the average of the six experiments given at page 203 of Laslett's "Timber and Timber Trees," were W = 64 and P = 534. Wood strong and tenacious, durable, extensively used in Australia for beams, railway sleepers, piers and bridges; also for ship-building. The wood from the Nilgiri plantations has scarcely been used, except for firewood or charcoal. The leaves give an essential oil used in medicine, and paper has been made of the bark.

		lbs.
W 1094.	Nilgiri Hills, 7,400 feet age 18 years, height 95 feet . .	43
W 1095-7.	" " 6,000 " " 2, 3, 4 " " 42, 43, and 60 feet ...	

3. PSIDIUM, Linn.

1. P. Guava, Raddi; Hook. Fl. Ind. ii. 468; Brandis 232; Kurz i. 476; Gamble 40. *P. pomiferum* and *P. pyriferum*, Willd.; Roxb. Fl. Ind. ii. 480. The Guava Tree. Vern. *Amrút, amrúd, safri-ám*, Hind.; *Peyara*, Beng.; *Amuk*, Nep.; *Modhuriam*, Ass.; *Piyara*, Beng.; *Segapu, koaya*, Tam.; *Jama, coya*, Tel.; *Pela*, Mal.; *Sebe*, Kan.; *Malaka beng*, Burm.

A small evergreen tree, with smooth and thin greenish grey bark, peeling off in thin flakes. Wood whitish, moderately hard, even-grained. Pores small, numerous. Medullary rays moderately broad, short, the distance between them many times greater than the transverse diameter of the pores.

Introduced from America and now cultivated and occasionally semi-wild allover India.

Weight, Wallich gives 44 lbs.; our specimen 42 lbs.; Skinner 47 lbs. and P = 618.

Cultivated for its fruit. The bark is used in medicine as an astringent, and (or the leaves) for dyeing in Assam. Skinner says that the wood works well and smoothly, that it is used for wood-engraving and for spear handles and instruments.

		lbs.
O 1371.	Gonda, Oudh	42

4. EUGENIA, Linn.

One of the largest of the Indian genera of trees. It contains about 77 trees, chiefly found in the moist zones of North-East and South India and Burma; 33 occur in South India, and 30 to 40 in Burma, 4 in the North-West and Central India, and a large number in Eastern Bengal. Few of them are, however, of very great importance; and besides those here described, it will suffice to mention only one or two of the most

common A list taken from Mr Duthie's description in Volume II of the Flora Indica, pages 471 to 506, is, however, given for the sake of the references —

SECTION I—JAMBOSA

1	*E formosa*, Wall	North East Himalaya down to Burma
2	*E amplexicaulis*, Roxb Fl Ind ii 483, Kurz i 493	Chittagong
3	*E malaccensis* Linn	(Cultivated)
4	*E polypetala* Wight, Kurz i 493 (*E angustifolia*, Roxb Fl Ind ii 490)	Khasia Hills Eastern Bengal, Chittagong
5	*E diospyrifolia*, Wall	Khasia Hills Sylhet
6	*E Munronii*, Wight, Beddome cix	Khasia Hills, Western Ghâts
7.	*E aquea* Burm, Roxb Fl Ind ii 492, Beddome cix, Kurz i 494	Chittagong Burma, Ceylon
8	*E Jambos* Linn, Roxb Fl Ind ii 494, Beddome cix, Brandis 233, Kurz i 495, Gamble 40	(Cultivated)
9	*E macrocarpa* Roxb Fl Ind ii 497, Kurz i 492	Eastern Bengal, Burma
10	*E javanica*, Lamk, Kurz i 494 (*E alba*, Roxb Fl Ind ii 493)	Andaman Islands
11	*E Wallichii*, Wight	North East Himalaya down to Burma
Var	[illegible]	North and East Bengal
12	[illegible]	Eastern Bengal, Burma
13	[illegible]	Burma
14	*E Beddomei*, Duthie	Tinnevelly
15	*E pachyphylla*, Kurz i 490	Tenasserim
16	*E tristis*, Kurz i 490	Ditto
17	*E hemisphærica*, Wight, Beddome t 203	Western Ghats, Ceylon
18	*E lanceolaria* Roxb Fl Ind ii 491	Sylhet
19	*E bifaria*, Wall (*E laurifolia*, Roxb Fl Ind ii 489)	Ditto
20	*E Kurzii*, Duthie	North East Himalaya to Burma
21	*E albiflora*, Duthie Kurz i 491	Burma
22	*E læta*, Ham (*E Wightii* Beddome cix)	Western Ghâts
23	*E ramosissima*, Wall, Gamble 40	North East Himalaya to Sylhet
24	*E Helferi* Duthie	Mergui
25	*E mangifolia*, Wall	Assam Eastern Bengal
26	*E inophylla*, Roxb Fl Ind ii 490	Eastern Bengal Burma

SECTION II—SYZYGIUM

27	*E Jhumra*, Roxb Fl Ind ii 495 Kurz i 488	Burma.
28	*E rubens*, Roxb Fl Ind ii 496, Kurz i 488 .	Chittagong, Burma
29	*E cymosa* Lam, Kurz i 486	Eastern Bengal, Burma.
30	*E toddalioides*, Wight [*E toddaliæfolia*, Wight, Gamble 41 (*Misprint*)]	Sikkim, Mergui
31	*E myrtifolia* Roxb Fl Ind ii 490, Kurz i 486	Eastern Bengal Burma.
32	*E acuminatissima* Kurz i 487. .	Mergui
33.	*E Arnottiana*, Wight, Beddome cvii Vern *Nawal*	Western Ghâts
34	*E claviflora*, Roxb Fl Ind ii 488, Kurz i 480, Gamble 41	North East Himalaya down to Burma, Andamans
35	*E leptantha* Wight, Kurz i 480 .	Sikkim Burma Andamans

36.	*E. Wightiana*, Wight; Beddome (*E. lanceolata*, Wight; Beddome cx).	Western Ghâts, Ceylon.
37.	*E. pellucida*, Duthie (*E. contracta*, Kurz i. 481)	Burma.
38.	*E. zeylanica*, Wight; Kurz i. 481 (*E. spicata*, Lam.; Beddome t. 202. *E. glandulifera*, Roxb. Fl. Ind. ii. 496).	Eastern Bengal, Burma, Andamans, Western Ghâts.
39.	*E. grata*, Wall.; Kurz i. 480	Assam, Khasia Hills, Burma.
40.	*E. rubricaulis*, Miq.	Tenasserim.
41.	*E. montana*, Wight; Beddome cvii.	Nilgiris.
42.	*E. bracteolata*, Wight; Kurz i. 482	Tenasserim.
43.	*E. lissophylla*, Thwaites; Beddome cviii.	Western Ghâts, Ceylon.
44.	*E. venusta*, Roxb. Fl. Ind. ii. 491; Kurz i. 487	Tipperah, Burma.
45.	*E. Gardneri*, Thw.; Beddome cviii.	Western Ghâts, Ceylon.
46.	*E. caryophyllæa*, Wight; Beddome cviii.	Ditto, ditto.
47.	*E. frondosa*, Wall.	Nepal.
48.	*E. areolata*, DC.	Ditto.
49.	*E. khasiana*, Duthie	Khasia Hills.
50.	*E. revoluta*, Wight; Beddome cvii.	Nilgiris.
51.	*E. oblata*, Roxb. Fl. Ind. ii. 493; Kurz i. 488	Assam down to Burma.
52.	*E. calophyllifolia*, Wight; Beddome cvii.	Nilgiris.
53.	*E. rubicunda*, Wight; Beddome cviii.	Tinnevelly.
54.	*E. cuneata*, Wall.	Khasia Hills, Eastern Bengal.
55.	*E. brachiata*, Roxb. Fl. Ind. ii. 488 (*E. cinerea*, Kurz i. 483).	Burma.
56.	*E. polyantha*, Wight	Ditto.
57.	*E. malabarica*, Beddome t. 199	Wynaad.
58.	*E. alternifolia*, Wight; Beddome t. 198	Assam, Carnatic.
59.	*E. tetragona*, Wight	Sikkim, Khasia Hills, Sylhet.
60.	*E. occlusa*, Miq.	Nicobar Islands.
61.	*E. operculata*, Roxb.	Sub-Himalaya, Eastern Bengal, South India, Burma.
Var.	*E. Paniala*, Roxb. Fl. Ind. ii. 489	Eastern Bengal, Burma.
Var.	*E. obovata*, Wall.	Northern Bengal, Burma.
62.	*E. Stocksii*, Duthie	Concan, Wynaad.
63.	*E. balsamea*, Wight; Kurz i. 485; Gamble 41	Sikkim, Eastern Bengal, Burma.
64.	*E. fruticosa*, Roxb. Fl. Ind. ii. 487; Kurz i. 485	Sylhet to Burma.
65.	*E. Jambolana*, Lam.	Throughout India.
Var.	*E. caryophyllæfolia*, Roxb. Fl. Ind. ii. 486	
Var.	*E. obtusifolia*, Roxb. Fl. Ind. ii. 485	
65.	*E. Heyneana*, Wall.	Central India, Western Ghâts.

SECTION III.—EUGENIA.

66.	*E. Jossinia*, Duthie (*E. cuneata*, Beddome)	Western Ghâts.
67.	*E. floccosa*, Beddome t. 200	Tinnevelly.
68.	*E. codyensis*, Munro	Nilgiris, Coorg.
69.	*E. macrosepala*, Duthie	Northern Kanara.
70.	*E. calcadensis*, Beddome cx.	Tinnevelly.
71.	*E. bracteata*, Roxb. Fl. Ind. ii. 490; Beddome cx.	Eastern Bengal, South India, Western Ghâts.
72.	*E. Rottleriana*, W. and A.; Beddome cx.	Southern India.
73.	*E. argentea*, Beddome cx.	Wynaad.
74.	*E. Mooniana*, Wight; Beddome cx.	Southern India, Western Ghâts.
75.	*E. microphylla*, Beddome cx.	Travancore.
76.	*E. singampattiana*, Beddome t. 273	Tinnevelly.
77.	*E. wynadensis*, Beddome cx.	Wynaad.

E Jambos Linn Vern *Gulab jaman* Hind *Malle nerale* Coorg is the Rose Apple cultivated for ornament and for its fruit *E Arnottiana* Wight Vern
at above 4 000 feet elevat on
is a large tree of the forests of
Madras *E aquea* Lumph ,
t cosa Roxb Vern *Moung*
of the forests of Chittagong
ceæfolia Roxb are handsome

Wood rough, hard and moderately hard, seasons well Some species have concentric bands of softer tissue and others have not The pores are from small to moderate sized

1 **E formosa**, Wall , Hook Fl Ind. ii 471 , Kurz i 492, Gamble 40 *L ternifolia*, Roxb Fl Ind ii 489 Vern *Bara jaman*, Nep , *Bunkonkri*, Mechi , *Bolsobak*, Garo , *Famsikól*, Lepcha

A moderate sized evergreen tree Bark greyish white smooth, thin Wood grey, hard Pores moderate sized Medullary rays fine and very fine, numerous, prominent

Eastern Himalaya and Sub Himalayan tract near streams Chittagong and Tenasserim

Weight 61 lbs per cubic foot Has large very handsome flowers and large fruit

		lbs
E 2956	Tista Valley Darjeeling	61

2 **E malaccensis**, Linn Hook Fl Ind ii 471 , Roxb Fl Ind ii 483 , Kurz i 493 Vern *Thabyoo thabyay*, Burm

A moderate sized evergreen tree Wood reddish grey, rough, soft Pores moderate sized and large Medullary rays broad or moderately broad, visible on a radial section

Cultivated in Bengal and Burma for its fruit

Weight Wallich gives 30 our specimen 38 lbs per cubic foot

		lbs
B 309	Burma (1867)	38

3 **E grandis**, Wight , Hook Fl Ind ii 475 , Beddome cxii , Kurz i 489 *E cymosa*, Roxb Fl Ind ii 492 Vern *Jam*, Beng , *Batti jamb*, Sylhet , *Zebri*, Magh , *Toung thabyay*, Burm

An evergreen tree Wood red, rough, hard Pores small, joined by fine, wavy, concentric lines Medullary rays fine, wavy, numerous, uniform and equidistant

Eastern Bengal Burma and the Andaman Islands

Weight 51 to 52 lbs

		lbs.
B 314	Burma (1867)	51
B 2256	Andaman Islands (1866)	52

B 2713, 48 lbs., brought from Tavoy by Dr Wallich in 1828 has a structure similar to that of *L grandis*

4 **E Kurzii**, Duthie, Hook Fl Ind ii 478, Kurz i 491, *E cerasiflora*, Kurz , Gamble 41 Vern *Jamun*, Nep , *Sunom*, Lepcha

A large evergreen tree Bark ½ inch thick, whitish grey Wood reddish grey, moderately hard, rough Pores moderate-sized, numerous, often subdivided Medullary rays fine and moderately broad

Hills of Bengal and Burma, from 3,000 to 6,000 feet.
Weight, 37 to 56 lbs. per cubic foot.

		lbs.
E 701.	Sepoydura Forest, Darjeeling, 5,500 feet.	56
E 2955.	Tukdah Forest, Darjeeling, 5,000 feet (young tree) . .	37

5. E. tetragona, Wight; Hook. Fl. Ind. ii. 497: Kurz i. 484. *E. præcox*, Roxb.; Gamble 41. Vern. *Kemma, chamlani*, Nep.; *Sunóm*, Lepcha.

A large evergreen tree. Wood brownish or olive grey, shining, hard. Pores moderate-sized, numerous, uniformly distributed, oval and subdivided. Medullary rays fine, visible on a radial section.

Hills of Northern Bengal up to 6,000 feet, Chittagong.
Weight, 47 lbs. per cubic foot. Wood used occasionally for building and for the handles of tools and for charcoal.

		lbs.
E 682.	Sepoydura Forest, 5,500 feet, Darjeeling	46
E 1446.	Mishmi Hills (Griffith, 1836)	48

6. E. operculata, Roxb. Fl. Ind. ii. 486; Brandis 234; Kurz i. 482. *E. nervosa*, DC.; Beddome cvi. Vern. *Rai jáman, paiman, jamawa, dúgdúgia*, Hind.; *Yethabyay*, Burm.

A moderate-sized evergreen tree, leaves turning red in the cold season. Bark grey or dark brown, rough, with irregular hard scales, leaving cavities when they exfoliate. Wood reddish grey, hard. Pores small, often in radial lines. Medullary rays very fine, closely packed, extremely numerous.

Sub-Himalayan tract from the Jumna to Assam, Chittagong, Burma, Western Gháts and Ceylon.
Weight, 47 lbs. per cubic foot. Used for building and agricultural implements. The fruit is eaten.

		lbs.
O 334.	Gorakhpur (1868)	51
B 305.	Burma (1867)	43

7. E. obovata, Wall.; Gamble 40. *E. operculata*, Roxb. var. *obovata*; Hook. Fl. Ind. ii. 498; Kurz i. 482. Vern. *Kiamoni*, Nep.; *Jungsong*, ...pcha; *Boda-jam*, Mechi.

... evergreen tree, leaves turning red in the cold season. Bark ..., smooth. Wood grey, rough, moderately hard. Pores moderate-...d, very numerous, joined by faint, concentric bands. Medullary rays fine.

Savannah forests of Bengal and Burma.
Weight, 51 lbs. per cubic foot. Fruit eaten.

		lbs.
E 584.	Khookloong Forest, Darjeeling Terai	51

8. E. Jambolana, Lam.; Hook. Fl. Ind. ii. 499 Roxb. Fl. Ind. ii. 484; Beddome t. 197; Brandis 233; Kurz i. 485; Gamble 40. Vern. *Jáman, jam, phalinda, jamni, phaláni, pharenda, phaunda, paiman*, Hind.; *Jam*, Beng.; *Jamo*, Uriya; *Phoberkúng*, Lepcha; *Chambu*, Gáro; *Kor-jam*, Mechi; *Jamu*, Ass.; *Naval, navvel, nawar, naga*, Tam.; *Nerale*, Mysore; *Narala*, Kan.; *Nasedu, nairuri, nareyr*, Tel.; *Naindi*, Gondi; *Jambúl*, Mar.; *Mahadan*, Cingh.; *Zebri, chaku, kau*, Magh; *Thabyai-pyoo*, Burm.

An evergreen tree. Bark $\frac{1}{4}$ inch thick, light grey, with large patches of darker colour, smooth, with shallow depressions caused by exfoliation.

Wood reddish grey, rough, moderately hard, darker near the centre, no distinct heartwood Pores moderate sized and small, numerous, frequently oval elongated and subdivided Medullary rays fine numerous, the interval between the rays less than the diameter of the pores Faint, fine, concentric bands of softer tissue

the act on of water well The bark is used for dyeing and tanning and is astr ngent and used in medicine for cases of dysentery The fruit is eaten It is one of the trees on which the tasar silk vorm is fed

		lbs
P 1192	Madhopur Panjab	40
P 452	Ajmere	44
O 209	Garhwal (1868)	51
O 210		47
O 211		19
O 2?4		44
O 239		40
O 2993	(1874)	47
O 527	D l ra Dun	59
O 535		64
O 675	Mol un Forest Kumaun Bhabar	58
O 337	Gorakhpur (1868)	?1
O 338		42
C 195	Mandla, Central Provinces (1870)	52
C 1135	Ahiri Reserve Central Provinces (with a sl ghtly d ff rent structure)	50
C 2761	Mol arli Reserve Central Provinces	43
C 1251	Gumsur Madras	57
E 664	Bakti Forest, Darjeel ng Terai	54
E 23?7	S voke Forest	44
E 1396	Cl ttagong	48
E 1958		48
I 413	S indarbans	
B 3065	Burma (1862)	52
No 51	Ceylon Collection	36

mang folia Wall

e name of *Eug nia* s milar to tl at of

sylvestris Wight

Hook Fl Ind ii 493 Beddome cxi (*Sy yyiu y sire* Thwaites Enum 110 V rn *Alubo* Cingh) In structure it resembl s *E Ja nbolana*

9 E Heyneana, Wall, Hook Fl Ind ii 500, *E salicifolia*, Wight, Beddome cix, Brandis 234 Vern *Pinjam bal* Mar, *Hendi*, Gondi, *Gambu*, Kurku

A large shrub or small tree with grey bark Wood similar to that of *E Jambolana*, but pores smaller

B tia Ghats Berar and Central Provinces

		lbs
C 2?86	Melghat Berar	38

10. E. *sp.* Vern. *Thabyay*, Burm.

A tree with hard, close-grained, red wood. Pores small, in irregular patches of soft tissue, joined by wavy, concentric lines. Medullary rays fine, numerous.

		lbs.
B 316.	Burma (1867)	55

5. BARRINGTONIA, Forst.

Contains about 8 Indian species chiefly from Burma. *B. speciosa*, Forst.; Hook. Fl. Ind. ii. 507; Roxb. Fl. Ind. li. 636; Beddome cxii.; Kurz i. 496. Vern. *Kyaigyee*, Burm.; *Doddá*, Andamans, is an evergreen tree of the sea-shore of the Andamans. *B. pterocarpa*, Kurz i. 498; Hook. Fl. Ind. ii. 509. Vern. *Kyaitha*, Burm., is an evergreen tree of the tropical forests of Pegu and Martaban. Four other species are described as found in Tenasserim, *viz.*, *B. conoidea*, Griff., *B. augusta*, Kurz, *B. Helferi*, C. B. Clarke, and *B. macrostachya*, Kurz (including *B. pendula*, Kurz).

Wood soft or moderately hard. Pores small, in short radial lines between the numerous broad, or moderately broad, medullary rays. Numerous transverse bars between the rays.

1. B. acutangula, Gaertn.; Hook. Fl. Ind. ii. 508; Roxb. Fl. Ind. ii. 635; Beddome t. 204; Brandis 235; Kurz i. 497. Vern. *Ijál, samundar phúl, panniári, ingar*, Hind.; *Hijál, samundar*, Beng.; *Kinjolo*, Uriya; Hark[illegible] Ass.; *Kanapa, batta, kurpá, kádamic*, Tel.; *Piwar*, Mar.; *Kyaith*[illegible] cavities Burm.

A m[illegible]ll, often in [illegible]vergreen tree. Bark ½ inch thick, dark brown, rough. [illegible]emely numeishining, warps in seasoning, moderately hard, even-grained[illegible]yan tract from[illegible]ll, in radial groups between the broad and very broad, rarely [illegible] [illegible]rately broad, long medullary rays, whi[illegible] the greater par[illegible]er cubic foot. The space between [illegible] where not occup[illegible] [illegible]res, consists of narrow [illegible] with fine transvers[illegible] (1868) [illegible]hter colour. The radi[illegible] tifully mottled with 67) [illegible] rays, which appear as [illegible]

Sub-Himalayan tract[illegible] Gamble 4[illegible]eastwards, Oudh, Bengal, Central and South India, Burma. [illegible]rz i. 482. Ve[illegible]

Weight, Skinner, No. 20, gi[illegible] ile Kyd's experiments (*Stravadium acutangulum*) give only [illegible] lbs [illegible] weighed 46 lbs. per cubic foot. Benson's experiments wi[illegible] o[illegible] turning red in feet × 1·4 inch × 1·4 inch gave P = 648; Skinne[illegible] [illegible]ugh, moderatel[illegible]ents on Assam wood in bars 2 feet × 1 inch × 1 inch [illegible]faint, concentric[illegible]able.

The wood is used for l[illegible] rice-pou[illegible]ders and by cabinet-makers. The bark is used t[illegible] ing; an[illegible] as well as the leaves and fruit, in native medicine. [illegible]ns black when buried in mud.

		lbs.
C 1132.	Ahiri Reserve	
B 814.	Burma	46

2. B. racemosa, Blun[illegible] ii. 507; Roxb. Fl. Ind. ii. 634; Beddome cxii.; Kur[illegible] [illegible]amudra, cuddapah, Tam., Mal.; *Kyai-beng*, Burm.

A moderate-sized evergreen tr[illegible] white, very soft, porous. Pores small and moderate-sized, num[illegible] uniformly distributed. Medullary rays moderately broad, long, equidistant.

Western Coast, Andaman Islands and Ceylon. It is mentioned from Assam by G. Mann in Assam Forest Report, 1874-75. Vern. *Kumringak*, Ass., but *B. acutangula* may be meant.

Skinner No 21 gives weight 53 lbs (?) per cubic foot and P = 819 he also says it is used for house and cart building and that it has been tried for railway sleepers

		lbs
B 1993	Andaman Islands (Kurz 1866)	27

6 CAREYA, Roxb

[illegible]

April and best after the grass has been burnt by jungle fires

1 C arborea, Roxb Fl Ind ii 638 , Hook Fl Ind ii 511, Beddome t 205, Brandis 236 Kurz i 409, Gamble 11 Vern *Kumbi, Kumbh, Khumbi*, Hind , *Pilu*, Banda , *Gurar*, Mandla, Balaghat, *Kumri*, Chhindwara , *Gu amar*, Gondi , *Boktok*, Lepcha , *Dambel*, Garo , *Ayma, pailae, poota tammi*, Tam , *B ida durmi, buda darini, dudippi*, Tel , *Gaiuldi*, Mysore , *Bambway*, Burm , *Kabooay*, Taleing , *Tagooyi*, Karen , *Kahatte*, Cingh

A large deciduous tree, leaves turning red in the cold season Bark ½ inch thick, dark grey, with vertical and diagonal cracks, exfoliating in narrow flakes, inner substance reddish, fibrous Sapwood whitish, large, heartwood dull red sometimes claret coloured, very dark in old trees, even-grained, beautifully mottled, seasons well, very durable, moderately hard Pores oval, small and moderate sized, subdivided Medullary rays numerous, fine, equidistant and uniform, the space between two consecutive rays equal to the diameter of the pores The medullary rays are visible on a radial section as narrow bands

Sub Himalayan tract from the Jumna eastwards Bengal Burma Central and South India Growth fast a round in the Bengal Fruit Museum gave 4 rings per inch of radius

The weight and transverse strength have been determined by the following experiments —

Experiment by whom conducted	Year	Wood whence procured.	Number of experiments.	Size of scantling	Weight.	Value of P
				Ft In In	lbs	
Wallich		Goalpara	..		43	......
Adrian Mendis	1855	Ceylon			39	.....
R. Thompson	1869	Central Provinces		.....	60	.. ..
Skinner No 39	1862	South India	..	Various	60	870
Benson		Burma		3 × 1 4 × 1 4	47	879
Brandis, Nos. 62, 63	1863	..	...		45	......
..	1864		4	3 × 1 × 1	60	890
..	..		6	2 × × 1	51	6.5
Kyd	1831	Assam	1	2 × 1 × 1	61	679
Commt. Dept.	...	Moulmein.	..	......	50	905
Smyth ee	1878	See list below	13	......	54 8	

Wood durable; the specimens brought by Dr. Wallich from Tavoy in 1828, and that brought from the Mishmi Hills by Dr. Griffith in 1836, were quite sound on being cut up, though they had been stored for 50 years in Calcutta. The wood is little used except for agricultural implements. It is being tried for railway sleepers on the Eastern Bengal and Northern Bengal State Railways, but the result of the experiment is not yet known. Kurz says it is used in Burma for gun-stocks, house-posts, planking, carts, furniture and cabinet-work. It stands well under water. Fuzes made from its bark are used to make slow matches. Its bark gives a good fibre for coarse, strong cordage, and is used in native medicine as an astringent.

		lbs.
O 208.	Garhwal (1868)	53
O 228.	" "	53
O 1479.	Kheri, Oudh	59
C 1131.	Ahiri Reserve, Central Provinces	58
C 2747.	Moharli Reserve " " (sapwood)	37
E 624.	Rakti Forest, Darjeeling Terai	48
E 2378.	Sivoke " " "	51
E 1441.	Mishmi Hills (Griffith, 1836)	56
B 2703.	Tavoy (Wallich, 1822)	59
B 2685.	" " "	56
B 2710.	" " "	51
B 2228.	Andaman Islands (1866)	55
B 3147.	" " (Home, 1874)	56
No. 41.	Ceylon Collection	38

7. PLANCHONIA, Bl.

1. P. littoralis, Van Houtte; Hook. Fl. Ind. ii. 511. *P. valida*, Blume; Kurz i. 500. Vern. *Bambway nee*, Burm.; *Baila dá*, And.

An evergreen tree. Wood reddish brown, with yellow specks, very hard, close-grained. Pores moderate-sized and large, often subdivided, in rounded and elongated patches, which are sometimes joined by narrow, undulating bands of softer tissue. Medullary rays very fine, numerous, bending. The pores are frequently filled by a yellow substance, and are prominent on a vertical section.

Evergreen coast forests of the Andaman Islands.

Weight, our specimens give 61 to 64 lbs. per cubic foot; Bennett gives 56 lbs. and P = 600. A valuable wood, which should be better known; it seasons well and takes a fine polish.

		lbs.
B 514.	Andaman Islands	64
B 2495.	" " (Home, 1874, No. 7, *Youaygyee*)	61

ORDER XLVII. MELASTOMACEÆ.

An Order containing 13 Indian Genera of shrubs or small trees. They are chiefly found in South India or Tenasserim. They belong to 5 Tribes, *viz.*,—

Tribe	I.—Osbeckieæ	*Osbeckia*, *Otanthera* and *Melastoma*.
"	II.—Oxysporeæ	*Oxyspora*, *Kendrickia*, *Allomorphia*, *Blastus*, *Ochthocharis* and *Anerincleistus*.
"	III.—Medinilleæ	*Anplectrum*, *Medinilla*.
"	IV.—Astronieæ	*Pternandra*.
"	V.—Memecyleæ	*Memecylon*.

Oxyspora paniculata, DC.; Hook. Fl. Ind. ii. 525; Gamble 41 is a large handsome shrub of the Eastern Himalaya and Khasia Hills. *Memecylon* contains about

20 species of shrubs or small trees *M. umbellatum*, Burm , Beddome t 206, Kurz i 516 Vern *Udatalli* Kan is a small tree of the hills of South India Arracan and the Andamans whose wood is said by Beddome to be like boxwood and by VanSomeren to be durable *M edule* Roxb , Beddome cxiii , Kurz i 512 Vern *Alli* Tel , *Anjan*, *kurpa* Bombay, is a small tree of the Eastern Ghats of South India, Tenasserim and the Andamans with a strong hard wood and edible fruit, while *M amabile*, Bedd and *M gracile* Bedd are small trees of the Western Ghâts The remaining genera contain shrubs or climbers of little forest interest

1 OSBECKIA, Linn

Contains a number of handsome flowering herbs and shrubs of little importance

1. O crinita, Benth , Hook Fl Ind ii 517 *O stellata*, Don, Gamble 41 Vern *Number*, Lepcha

A shrub Bark greyish brown, smooth Wood light brown, moderately hard. Annual rings marked by a white line and more numerous pores Pores moderate-sized, scanty Medullary rays crooked, fine, the distance between the rays equal to the diameter of the pores

Eastern Himalaya and Khasia Hills from 4 000 to 8,000 feet
A very pretty shrub, common about Darjeeling

E 3310 Darjeeling, 6 500 feet

2 MELASTOMA, Linn

Four Indian species

1. M. Malabathricum, Linn , Hook. Fl Ind ii 523, Roxb Fl Ind ii. 405, Kurz i 503, Gamble 41 The Indian Rhododendron Vern *Chouliay*, Nep , *Lungbram*, Lepcha , *Shapti*, *tunka*, Mechi, *Myetpyai*, Burm

A large shrub Back reddish brown, thin, smooth Wood moderately hard, light brown, with medullary patches Pores moderate-sized, often in concentric groups, and surrounded with white tissue Medullary rays short, fine to moderately broad, numerous, unequally distributed Concentric bands of soft tissue often joining the pores

Throughout India up to 6 000 feet, chiefly near watercourses
This is probably the *Lutki* bush on which according to Mr Brownlow of Cachar (*Journal of the Agri Horticultural Society of Calcutta*), *the silkworm Attacus Atlas* is often found and fed on which it gives a very white silk

E 3275 Borojhar Reserve, W. Duars

Order XLVIII LYTHRARIEÆ

Contains 8 Indian Genera of trees or shrubs all belonging to the tribe Lythreæ Of these 6 Genera are here described *Pemphis acidula*, Forst , Hook Fl Ind ii 571 Beddome cxvii , Kurz i 518, is an evergreen shrub of the sea-coast of Malabar, Tenasserim and the Andamans, while *Crypteronia paniculata* Bl , Kurz i 519 (*C pubescens* Bl and *C glabra*, Bl in Hook Fl Ind ii 571) Vern *[illegible]* Burm, is an evergreen tree of the upper tropical and moist forests of Chittagong and Burma Brandis in his Burma List, 1862 No 113 says it has a reddish [illegible] straight grained wood, used occasionally for cart wheels, but more [illegible] Burma

Medullary rays fine or very fine and very numero[illegible]

1. WOODFORDIA, Salisbury.

1. W. floribunda, Salisb.; Hook. Fl. Ind. ii. 572; Brandis 238; Gamble 42. *W. tomentosa,* Beddome cxvii. *W. fruticosa,* Kurz i. 518. *Grislea tomentosa,* Roxb. Fl. Ind. ii. 233. Vern. *Dáwi, thawi, sautha, dhaulu,* Hind.; *Gul daur,* Kangra; *Dhai,* Kumaun; *Dhewti,* Oudh; *Dhuvi, surtári,* C.P.; *Pitta, petisurali, surteyli,* Gondi; *Khinni, dhi,* Kurku; *Dahiri, laldairo,* Nep.; *Chungkyek dum,* Lepcha; *Jatiko,* Uriya; *Jargi,* Tel.; *Phulsatti,* Mar.; *Datti,* Bhíl.

A large shrub with smooth bark, marked by longitudinal raised lines or protuberances, peeling off in thin scales. Wood reddish white, hard, close-grained. Pores small, uniformly distributed, sometimes in radial lines, medullary rays fine and very fine, closely packed.

Common throughout India, ascending to 5,000 feet in the Himalayas.

Cunningham gives weight 58 lbs., P = 730; our specimen weighs 46 lbs. The flowers give a red dye, which is used to dye silks.

			lbs.
C	2794.	Melghát, Berar	46
E	876.	Chenga Forest, Darjeeling Terai	...

2. LAWSONIA, Linn.

1. L. alba, Lam.; Hook. Fl. Ind. ii. 573; Beddome cxviii.; Brandis 238; Gamble 42. *L. inermis,* Linn.; Roxb. Fl. Ind. ii. 258; Kurz i. 519. The Henna Plant of Egypt. Vern. *Mehndi,* Hind.; *Dan,* Burm.; *Manghati,* Uriya; *Marithondi,* Tam.; *Gorantlu,* Kan.

A shrub with thin, greyish-brown bark. Wood grey, hard, close-grained; alternate bands of tissue, with fewer and more numerous pores, which may possibly be annual rings. Pores small and joined by faint, short, interrupted concentric bands. Medullary rays fine.

Wild in Beluchistan, on the Coromandel coast and perhaps in Central India.

Cultivated throughout India as a hedge plant and for its leaves, which, powdered and made into a paste, give the "henna" dye which is used to dye the nails, skin and beard.

C 2000. Nimar, Central Provinces.

3. LAGERSTRÖMIA, Linn.

Contains 11 Indian species, dispersed principally over South India and Burma, while a few extend to North-East India and Assam, and one to North-West and Central India. *L. indica,* Linn.; Hook. Fl. Ind. ii. 575; Roxb. Fl. Ind. ii. 505; Kurz i. 521 Vern. *Telinga-china,* Hind., is a handsome shrub, with pink flowers, cultivated in gardens in most parts of India. *L. calyculata,* Kurz i. 522. Vern. *Pymmahpyoo,* Burm., is an evergreen tree of the Martaban Hills. *L. floribunda,* Jack., a small tree of Tenasserim and *L. villosa,* Wall.; Kurz i. 524. Vern. *Young kalay,* a deciduous tree of the forests of the Pegu Yoma and Martaban.

The pores are of different sizes, the small pores being arranged in narrow, concentric bands, which join the lines of large pores. Medullary rays uniform, equidistant, fine and numerous.

1. L. parviflora, Hook. Fl. Ind. ii. 575; Roxb. Fl. Ind. ii. 505; Beddome t. 31; Brandis 239; Kurz i. 521; Gamble 42. Vern. *Bákli, kat dhaura, dhaura, lendya, seina, sida, asid,* Hind.; *Sida,* Beng., Mechi, Ass.; *Borderi, bordengri,* Nep.; *Kauhil,* Lepcha; *Shida,* Gáro; *Shej,*

Banda, *Seji*, Bijeragogarh, *Kakria*, Guz.; *Sahine*, Chanda, *Chinangi*, Tel.; *Chungi*, ... *Vellinandi*, *sina*, *lendi*, Mar.; ... *Sina*, *nelli*, *leria*, Gondi; *Cheker* ... exfoliating in long, ...

Pores moderate-sized and large, ... and frequently joined by narro... softer texture, distinctly visible ... rays fine, numerous.

Sub-Himalayan Tract from the Jumna eastwards, Oudh, Bengal, Assam, Central and South India

The weight and transverse strength have been given by the following experiments —

	Ft	In	In		Weight	Value of P
	2 ×	1 ×	1	found	52	757
	various			„	40	467
				„	40	..
				,	52	—

Wood tough, elastic, seasons well, works freely and is fairly durable It coppices well. Ten sleepers laid down on the Oudh and Rohilkhand Railway in 1870 were reported, ... A number of sleepers are being tried on ... result is not yet known It is used for ... construction, for buggy shafts and axe handles It gives a very good charcoal It gives a sweet gum from wounds in the bark The bark is used for tanning It is one of the trees on which the "tasar" silkworm is fed

		lbs
O 232	Garhwal (1868)	15
O 2909	„ (1871)	51
O 339	Gorakhpur (1868)	54
C 196	Mandla, Central Provinces (1870)	49
C 2735 C 2710	Moharli Reserve, Central Provinces	50
C 1110	Ahiri Reserve, Central Provinces	60
C 2769	Melghát, Berar	51
E 666	Bamunpokri, Darjeeling Terai	52
E 2370	Sukna Forest „ „	54
E 785	Kámrúp, Assam	..

2. **L. lanceolata**, Beddome t. 32, Brandis 210 *L. parviflora*, Roxb. *var majuscula*, C. B. Clarke, Hook. Fl. Ind. i 575 Vern. *Bandára*, *nandi*, Kan.; *Nána*, *sokutia*, Mar., *Boda*, *bondaga*, Dekkan

A large tree, with leaves bluish white beneath. Inner wood red, moderately hard. Pores large and moderate-sized, joined by wavy concentric bands of soft texture, which are often interrupted. Medullary rays fine, numerous, uniform, equidistant.

Forests of the Western Gháts as far north as Khandeish, Mysore and Courtallum

Growth moderate, 10 rings per inch of radius. Weight, 57 lbs. per cubic foot.

		lbs
C 936	Guzerat, Bombay	..
W 1220	North Kanara	57

3. **L. microcarpa**, Wight; Beddome t. 30; *L. lanceolata*, Wall; Hook. Fl. Ind. ii. 576, Brandis 210 Vern. *Benteak*, *venteak*, Tam.,

Ventaku, Tel.; *Bolundúr, billi nandi*, Kan.; *Nandi*, Coorg; *Nanah*, Mar.

A large tree with smooth white bark, peeling off in thin flakes. Wood red, moderately hard. Pores large and small, often subdivided and frequently joined by narrow, irregular, wavy bands and lines of softer texture. Medullary rays extremely fine, very numerous. Distinct white concentric lines, which probably indicate the annual rings. Pores marked on a longitudinal section and medullary rays visible on a radial section as numerous narrow plates.

Western forests of the Madras Presidency.

Growth moderately fast, 6 to 8 rings per inch of radius. The weight and transverse strength have been determined as follows:

Experiment by whom conducted.	Year.	Whence procured.	Number of experiments.	Size of bar.	Weight.	Value of P.
				Ft. In. In.		
Skinner No. 85 . .	1862	......	......	Various	41	610
Puckle	1859	Mysore	5	2×1×1	41	939
List	1863	„	......	......	39	......
Balfour	...	Malabar	3	7×2×2	49	542
Smythies . . .	1878	South Kanara	2	......	48	......

Much used in construction and for ship-building, also for coffee-cases, and for furniture.

		lbs.
W 765.	South Kanara	48
W 862.	„ „	48

4. **L. Reginæ**, Roxb. Fl. Ind. ii. 505; Beddome t. 29; Brandis 240. *L. Flos-Reginæ*, Retz; Hook. Fl. Ind. ii. 577; Kurz i. 524. Vern. *Jarúl*, Beng.; *Ajhar*, Ass.; *Bolashari*, Gáro; *Kadali*, Tam.; *Challá*, Kan.; *Adamboe*, Mal.; *Taman, mota bondara*, Mar.; *Kamaung*, Magh; *Pymma*, Burm.; *Murute*, Cingh.

A large deciduous tree. Bark smooth, grey to cream-coloured. Wood shining, light red, hard; annual rings marked by a belt of large pores. Pores of all sizes from extremely small to large, the latter often subdivided, joined by narrow, wavy and often anastomosing concentric bands of soft tissue, which contain the smaller pores. Medullary rays very or extremely fine, often indistinct. The wood in Burma is frequently very porous with an abundance of large pores.

Eastern Bengal, Assam, Burma and Western Coast, extending north to Ratnagiri.

Growth moderate; our specimens show 7 rings per inch of radius. In 1876 Mr. Fisher measured 5 trees in the Sidli Forest, Goalpara district, Assam. The results were, on an average—

	In.	In.	In.	In.	In.
On a length of radius equivalent to a girth of	18	36	54	72	90
No. of rings	15	25	39	51	66

On an average, therefore, the number of rings per inch of radius is 4·6; and the tree appears to add a cubit to its girth every 13 years on an average. The weight and transverse strength have been determined by the following experiments.

Exper ment by whom conducted	Year	Wood whence procured	Number of exper ments	S ze of bar	Weight	Value of P
				Ft In In	lbs	
Wall ch		Ind a			46 5	
Adr an Mend s	1855	Ceylon			42	
Baker	18°9	Bengal	11	2 × 1 × 1		850
Skinner No 87	1862	South Ind a			40	637
Kyd	1831	Assam		2 × 1 × 1	37	407 ?
					39	633
		"			38	383 ?
Benson		Burma		3 × 1 4 × 1 4	38	819
Forbes Watson				3 × 1 5 × 1 5	36	6 1
Brandis, Nos 61 6°	186°				40 5*	
	1861		4	7 × ° × 2	47	690
Commissariat D partment		Moulmein			39	6°°
Smythies	1878	As below	10		43	

* Average of 37 and 44.

Tl e most valuable timber of Sylhet Cachar and Chittagong and in Burma tl e most valuable after teak It ı kinds of co struction timber parts of their gun carriages casks It gives a resin It India and even as far north as Lahore

		lbs
E 620	Eastern Duars Assam	48
L 1228	Sibsagar Assam	40
E 2188	Nowgong Assam	40
F 1272	Cachar	38 5
E 410	Sundarbans	47
F 710	Chittagong	47
W 726	South Kanara	46
B 808	Pegu	39
B 3067	Burma (1862)	40
B 2717	Tavoy (Wallich 1828)	42

5 L macrocarpa, Wall , Kurz ı 524 *L Flos Reginæ*, Retz, Hook Fl Ind ıı 577 Vern *Jarul*, Beng , *Koonpymmah*, Burm

A moderate sized deciduous tree Wood red, m derately hard, in structure resembling that of *L Reginæ*, but the bands of white tissue more prominent and large pores fewer

Burma in Pegu and Martaban
Weight 45 to 48 lbs per cubic foot

		lbs
B 296	Burma (1867)	49
B 3068	(1862)	45

6 L hypoleuca, Kurz ı 523, Hook Fl Ind ıı 577 Vern *Pymmah* Burm , *Pibdi*, And

A large deciduous tree with thin whitish bark Wood red, hard Pores very small to very large, in fine, wavy, concentric, anastomosing, but sometimes interrupted lines of softer tis ue, alternating with darker wood of firmer texture, in which the very fine medullary rays are distinctly visible

Andaman Islands
Growth slow 10 18 rings per in h of radius Weight 41 to 50

Major Prothoroe; our specimens give an average of 39 to 40 lbs.; Bennett gives 41 lbs. and P = 570. The wood is used largely in the Andamans for building, shingles and other purposes.

		lbs.
B 510.	Andaman Islands	...
B 2202.	" " (1866)	45
B 2274.	" " "	38
B 2283.	" " "	34
B 2496.	" " (Home, 1874, No. 2)	44

7. L. tomentosa, Presl; Hook. Fl. Ind. ii. 578; Kurz i. 522. Vern. *Laiza*, Burm.

A large deciduous tree. Bark $\frac{1}{3}$ inch thick, grey. Wood grey or greyish brown, close-grained, moderately hard. Pores from very small to very large, the latter often subdivided, joined by numerous concentric lines, alternating with broad bands of firmer tissue, in which the fine medullary rays are prominent.

Burma. Frequent in Pegu and Martaban.

Weight, according to Brandis' Catalogue, 1862, No. 59 (*L. pubescens*, Wall.), 53 lbs.; Brandis' 3 experiments in 1864 with bars 3 ft. × 1 inch × 1 inch gave: Weight 38 lbs. and P = 588. Our specimens give 46 and 53 lbs. The timber is valued for bows and spear handles, and is also used for canoes and cart-wheels.

		lbs.
B 572.	Prome	46
B 2533.	Burma (1862)	53

4. DUABANGA, Ham.

1. D. sonneratioides, Buch.; Kurz i. 525; Gamble 42. *Lagerströmia grandiflora*, Roxb. Fl. Ind. ii. 503. Vern. *Bandorhulla*, Beng.; *Lampatia*, Nep.; *Dúr*, Lepcha; *Kochan, kokan*, Ass.; *Jarúl-jhalna*, Cachar; *Bondorkella, bolchim*, Gáro; *Baichua*, Magh; *Myoukgnau*, Burm.

A lofty deciduous tree, with light-brown bark, peeling off in thin flakes. Wood grey, often streaked with yellow, soft, seasons well, neither warps nor splits. Pores large and moderate-sized, often oval and subdivided, uniformly distributed. Medullary rays fine, very numerous, wavy. Pores well marked on a longitudinal section.

Eastern Bengal ascending to 3,000 foot, Assam and Burma.

Growth fast, 5 rings per inch of radius. Weight, according to Brandis' Burma List of 1862, No. 64, 30 lbs. per cubic foot; our specimens give an average of 32 lbs. The wood does not warp or split, and canoes cut out of it green are at once used, even when liable alternately to wet and the heat of the sun. Is used in Northern Bengal and Assam very extensively for tea-boxes, for which purpose it is admirably fitted. It is also made into canoes and cattle troughs. The seeds are extremely small and the seedlings very minute at first, but the growth is very fast. Seedlings at the Bamunpokri Plantation in Bengal, which had come up on the sites of old charcoal kilns (see "Indian Forester," Vol. iv. page 345), attained a height of 10 feet in two years, with proportionate girth and fine spreading branches.

		lbs.
E 652.	Rakti Forest, Darjeeling Terai	32
E 2380.	Sukna Forest, Darjeeling Terai	32
E 950.	Eastern Dúars, Assam	32
E 1230.	Sibságar, Assam	36
E 1436.	Assam	29
E 1285.	Cachar	32
E 1499.	Sylhet	...
E 713.	Chittagong	31
B 807.	Pegu	30
B 1995.	Andamans (Kurz, 1866) (young tree)	21

5 SONNERATIA, Linn f

Conta s 4 I dian tr es found in the coast forests of S nd Bengal Malabar o described *S alba* forests of the Anda Burma

1 S acida, Linn f , Hook Fl Ind ii 579, Roxb Fl Ind ii 506, Beddome cxviii , Brandis 242, Kurz i 526 Vern *Orcha, archaka,* Beng , *Tapoo, tamoo,* Burm

A small evergreen tree Wood grey, soft, even grained Pores small, oval and subdivided, very numerous, uniformly distributed Medullary rays very fine, very numerous

T dal creeks and littoral forests of Ind a Burma and the Andamans

Weight 31 lbs per cub c foot The wood is said by Beddome to be used for models and in Ceylon to be a good substitute for coal in steamers The fruit is eaten in the Sundarbans

		lbs
E 395	Sundarbans	31

2 S apetala, Buch , Hook Fl Ind ii 579, Roxb Fl Ind ii 506, Beddome cxviii , Kurz i 527 Vern *Keowra*, Beng , *Kanpala,* Burm

A moderate sized evergreen tree Sapwood grey , heartwood reddish brown, moderately hard Pores small, numerous, oval and subdivided Medullary rays fine, very numerous

Tidal creeks and l ttoral forests of Bengal and Burma

We ght 41lbs per cub c foot The wood is said by Kurz to be good for house-building packing boxes etc

		lbs
E 399	Sundarbans	41

6 PUNICA, Linn

1 P Granatum, Linn Hook Fl Ind ii 581, Roxb Fl Ind ii 499, Beddome cxix , Brandis 241, Kurz i 528, Gamble 42 The Pomegranate Vern *Anár, darim, damu,* Hindi , *Dálim,* Kumaun, *Dalimbe,* Kan , *Thale,* Burm

A shrub or small tree Wood light yellow, with a small, darker coloured, irregularly shaped heartwood, compact and close grained Pores very small, uniformly distributed Medullary rays fine, very numerous Medullary patches common

		lbs
P 106	Sutlej Vall y Punjab	57

ORDER XLIV SAMYDA EÆ

C ta s tw ger ra *Cas rra* and *H maliam*

1. CASEARIA, Jacq.

Nine Indian species. *C. Vareca*, Roxb. Fl. Ind. ii. 418; Hook. Fl. Ind. ii. 593; Kurz i. 530; Gamble 43, is an evergreen shrub of the banks of streams in Northern and Eastern Bengal. *C. esculenta*, Roxb., *C. rubescens*, Dalz.; Beddome t. 41, and *C. wynaadensis*. Beddome cxx., are small trees of the forests of the Western Ghâts. *C. Kurzii*, C. B. Clarke; Hook. Fl. Ind. ii. 594, is a tree of Chittagong.

Wood yellowish white, moderately hard, rough. Medullary rays fine, numerous. Pores small or very small, often in radial groups or lines.

1. C. tomentosa, Roxb. Fl. Ind. ii. 421; Hook. Fl. Ind. ii. 593; Beddome cxix.; Brandis 243. Vern. *Chilla, chilara, bairi, bhari*, Hind.; *Maun*, Manbhúm; *Men, wasa, gamgudu*, Tel.; *Lainja, massei, karei*, Mar.; *Girari*, Uriya; *Thundri*, Gondi; *Khesa*, Kurku.

A small tree. Bark $\frac{1}{3}$ inch thick, brittle, exfoliating in more or less square flakes. Wood yellowish white, moderately hard, rough, close-grained. Pores small and very small, sometimes in radial lines. Medullary rays fine and very fine, wavy, equidistant, very numerous.

Sub-Himalayan tract from the Indus eastwards, Oudh, Eastern Bengal, Central and South India.

Weight, 41 lbs. per cubic foot. Wood used to make combs. The bark is bitter; it is used for adulterating the "Kamela" powder and the pounded fruit for poisoning fish.

		lbs.
O 1393.	Gonda, Oudh	41
O 3085.	" "	...
O 3089.	Kheri, Oudh	...
C 1183.	Ahiri Reserve, Central Provinces	41
C 2802.	Melghát, Berar (young)	38

2. C. graveolens, Dalzell; Hook. Fl. Ind. ii. 592; Brandis 243. Vern. *Chilla, náro, kathera, pimpri*, Hind.; *Girchi*, Gondi; *Rewat*, Kurku.

A small deciduous tree. Bark dark grey, with a few longitudinal wrinkles. Wood light yellow, moderately hard, rough, even-grained. Pores small, often oval and subdivided. Medullary rays fine, equidistant, very numerous, visible as shining plates on a radial section.

Sub-Himalayan tract from the Chenab eastwards, Oudh, Central India.

Weight, 40 to 50 lbs. Wood not used; the fruit is used to poison fish.

		lbs.
O 240.	Garhwal (1868)	42
O 271.	" "	40
O 1456.	Bahraich, Oudh	49
O 3090.	Kheri, Oudh	...

3. C. glomerata, Roxb. Fl. Ind. ii. 419; Hook. Fl. Ind. ii. 591; Kurz i. 530; Gamble 42. Vern. *Lúrjúr*, Sylhet; *Burgonli*, Nep.; *Sugvat*, Lepcha.

A large evergreen tree. Wood yellowish white, moderately hard, rough. Pores small, in radial lines. Medullary rays of two sizes; numerous very fine rays between fewer moderately broad, giving on a radial section a beautifully mottled appearance.

Eastern Bengal ascending to 6,000 feet, Chittagong.

Weight, 45 to 48 lbs. per cubic foot. Wood used for building, charcoal and occasionally for tea-boxes.

			lbs
E 691	Chuttockpur Forest, Darjeeling, 6 000 feet	.	48
E 2381	" " " "	. .	45

2 HOMALIUM, Jacq

Contains eight trees, chiefly Burmese *H zeylanicum* Bth , Hook Fl Ind ii 596, Beddome t 210, and *H travancoricum* Beddome t 211, are large trees of the Western Ghats *H minutiflorum*, Kurz i 532 *H propinquum*, C B Clarke, Hook Fl Ind ii 597, and *H Griffithianum* Kurz i 531 are small trees of Burma *H Schlichii*, Kurz i 532, is an evergreen tree of the tropical forests of Chittagong, and *H nepalense*, Bth , is found in Nepal

1. H. tomentosum, Bth , Hook Fl Ind ii 596, Brandis 243, Kurz i 531 *Blackwellia tomentosa*, Vent , Brandis' Burma Catalogue, 1862, No 58 Vern *Myoukshaw*, Burm

A large deciduous tree with thin, very smooth, white or greyish white bark Wood brown, with dark coloured heartwood, very hard, heavy and close-grained, splits in seasoning Pores small, in radial lines between the closely-packed and fine medullary rays, which are bent outwards where they touch the pores The distance between the rays is less than the transverse diameter of the pores

Chittagong and Burma

Weight Brandis in Burma List, 1862 No 58, gives 56 lbs His experiments made in 1864 were as follows

No	Size of bar	Weight	Value of P
2	3 × 1 × 1′	53	880
3	2 × 1″ × 1	54	868

Our specimens give an average of 58 lbs This may be the wood experimented on by Skinner, No 53 (see also under *Dalbergia lanceolaria* p 128) Weight 62 lbs, P = 1003 He calls it "Moulmein lancewood and *Moukshow* The wood is durable and is used for the teeth of harrows and for furniture

			lbs
B 331	Burma (1866)		63
B 2534	(1862)		60
B 2692	Tavoy (Wallich, 1828)	.	61
B 2699	" , ,	.	64
B 2702	" , "		55

Order L PASSIFLOREÆ

Only one species *Carica Papaya*, Linn , Roxb Fl Ind iii 824, Brandis 241, Kurz i 533, Gamble 43 The Papaw Tree Vern *Papaya*, Hind , *Perinji* kan , *Thimbawthee*, Burm , is a small, soft wooded, fast growing tree which was intr[illegible] from South America, and is now cult vated [illegible]

Order LI DATISCEÆ.

Two Genera. *Datisca cannabina* Linn , Hook Fl. Ind ii 656 Vern *Akalbir*, *Bhangjala*, Hind , is a tall, erect herb resembling hemp and found in the Punjab Himalaya It gives a red or yellow dye

1. TETRAMELES, R. Br.

1. T. nudiflora, R. Br.; Hook. Fl. Ind. ii. 657; Beddome t. 212; Brandis 245; Kurz i. 535; Gamble 43. Vern. *Mainakat*, Nep.; *Pajomko*, Lepcha; *Bolong*, Gáro; *Sandugaza*, Beng.; *Tseikpoban*, Magh; *Thitpouk*, Burm.; *Bolur*, Kan.

A very large deciduous tree, with cylindrical, often much-buttressed stem. Bark grey-brown, brinkled. Wood white, very light, soft. Annual rings marked by a belt of closer pores. Wood cells large. Pores large, often in short, zigzag, transverse lines. Medullary rays fine to moderately broad, clearly marked, the distance between the rays equal to the diameter of the pores.

Sikkim, Gáro Hills, Chittagong, Western Gháts, Burma and the Andamans. Growth very fast. The wood may be found useful for tea-boxes.

E 3288. Rinkheong Reserve, Chittagong.

ORDER LII. CACTEÆ.

Contains only the Prickly Pear, *Opuntia Dillenii*, Haw.; Hook. Fl. Ind. ii. 657; Brandis 245 (*Cactus indicus*, Roxb. Fl. Ind. ii. 475.) Vern. *Nágphana, nágphansi*, Hind.; *Pápásh kalli*, Kan.; *Chaffal send*, Dekkan. An erect, fleshy, thorny shrub common all over the arid and dry zones of India and often planted as a hedge. The stems have been used in time of scarcity as fodder. It was originally brought from America.

ORDER LIII. ARALIACEÆ.

Contains 16 Genera of usually small, soft-wooded trees or shrubs, erect or climbing. They are divided into four Tribes, *viz.*,—

Tribe I.—Araliceæ	*Aralia* and *Pentapanax*.
„ II.—Panaceæ	*Acanthopanax*, *Helwingia*, *Polyscias*, *Heptapleurum*, *Trevesia*, *Brassaia* and *Dendropanax*.
„ III.—Hedereæ	*Arthrophyllum*, *Heteropanax*, *Brassaiopsis*, *Macropanax*, *Hedera* and *Gamblea*.
„ IV.—Plerandreæ	*Tupidanthus*.

Aralia contains 6 shrubs or small trees, the chief of which are *A. foliolosa*, Seem., and *A. armata*, Seem. Vern. *Somri*, Nep.; *Kajyang*, Lepcha, small trees of the hills of the N.E. Himalaya with large 2-3 pinnate leaves, prickly stems and the general aspect of tree ferns. *A. cachemirica*, Dcne.; Brandis 248, is a shrub of the higher elevations of the Himalaya from Kashmir to Sikkim. *Pentapanax* contains 4 species of usually climbing epiphytic shrubs: *P. Leschenaultii*, Seem., *P. subcordatum*, Seem., and *P. racemosum*, Seem., are large climbers of the Sikkim Hills. *Acanthopanax aculeatum*, Seem., is a shrub of the Khasia Hills. *Polyscias acuminata*, Wight; Beddome t. 213, is a tree of the hills of South India above 4,000 feet elevation. *Trevesia palmata*, Vis.; Hook. Fl. Ind. ii. 732; Kurz. i. 539; Gamble 44. (*Gastonia palmata*, Roxb. Fl. Ind. ii. 407.) Vern. *Kajpati*, Nep.; *Suntong*, Lepcha; *Baw*, Burm., is an evergreen palm-like tree with large palmate leaves and big fruit, found in the Eastern Himalaya, Eastern Bengal and Burma. *Brassaia capitata*, C. B. Clarke; Hook. Fl. Ind. ii. 732, is a tree of the Nilgiri Hills. *Arthrophyllum diversifolium*, Bl.; Hook. Fl. Ind. ii. 733. (*A. javanicum*, Bl.; Kurz i. 540), is an evergreen palm-like tree of the Andamans. *Heteropanax fragrans*,

Seem, Hook Fl Ind ii, 731, Brandis 249, Kurz 541, Gamble 44. Vern. *Lal totilla*, Nep, *Sirnokhtem*, Lepcha, *Kesseru*, Assam, *Hona*, Cachar; *Tachansa*, Burm, is a small tree of the sub-Himalayan tract from Kumaun to Assam, Eastern Bengal, Chittagong and Burma It is important as being a tree upon whose leaves, as well as on those of the Castor Oil plant, the "Eri" silkworm of Assam (*Attacus Ricini*) is fed *Tupidanthus calyptratus*, H. f. and Th, is an evergreen scandent tree of the eastern slopes of the Arracan Yoma

The Chinese rice-paper is the pith of *Aralia papyrifera*, Hk, a tree of Formosa.

Wood white, generally soft. Pores small, often arranged in concentric bands. Medullary rays distant, broad or moderately broad, generally several lines of pores between two rays

1. HELWINGIA, Willd.

1. H. himalaica, Hook. f and Th.; Hook. Fl. Ind ii 726; Gamble 44 Vern *Lubbor*, Lepcha

A large shrub. Wood white, moderately hard, pith large Pores very small, arranged in groups or short concentric lines. Medullary rays short, fine to moderately broad.

Eastern Himalaya, above 7,000 feet, Khasia Hills

A curious shrub with simple leaves and flowers in umbels from the centre of the leaves, like those of *Ruscus*

E 3312 Darjeeling, 7,000 feet

2 HEPTAPLEURUM, Gaertn

Contains about 10 trees or climbers, among which 6 species occur in South India, 2 in Burma and 1 in the Sikkim Himalaya *H impressum*, C B Clarke, Hook Fl Ind ii 728 (*H tomentosum*, Ham, Gamble 44) Vern. *Baloo chinia*, Nep, [illegible] and Ceylon *H. rostratum*, Beddome cxxii, and *H Wallichianum*, C B Clarke, are trees of the Western Ghâts *H venulosum*, Seem, Brandis 249, Kurz i 538, Gamble 44 (*Aralia digitata*, Roxb Fl Ind ii 107) Vern. *Dain*, Hind; *Singhata*, Nep, is a climbing shrub or small tree of most parts of India

1. H. elatum, C. B. Clarke, Hook. Fl. Ind. ii. 728, Gamble 44. Vern *Chinia*, Nep; *Prongzam*, Lepcha

A tree. Bark ¼ in thick, greyish brown. Wood white, soft. Structure similar to that of *Macropanax undulatum*

Himalaya, from Kumaun to Bhutan, between 5,000 and 7,000 feet.

E 3326 Rangirúm, Darjeeling, 6,000 feet

3 BRASSAIOPSIS, Dene and Planch.

Contains several small palm like trees of the Eastern Himalaya, Eastern Bengal and Burma *B palmata* Kurz i 537, is found in the forests of Chittagong and the Andamans and *B Hainla*, Seem, Hook Fl Ind. ii 735, Gamble 44. Vern *Tilketter*, Nep, *Suntong*, Lepcha, is a common small tree in the forests of the outer Sikkim Himalaya

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1. T. nudiflora, R. Br.; Hook. Fl. Ind. ii. 657; Beddome t. 212; Brandis 245; Kurz i. 535; Gamble 43. Vern. *Mainakat*, Nep.; *Payomko*, Lepchá; *Bolong*, Gáro; *Sandugaza*, Beng.; *Tseikpoban*, Magh; *Thitpouk*, Burm.; *Bolur*, Kan.

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Seem , Hook Fl Ind ii, 734, Brandis 249, Kurz 541, Gamble 44 Vern *Tal totilla*, Nep , *Sirolkhtem*, Lepcha, *Kesseru*, Assam, *Hona*, Cachar, *Tachansa*, Burm , is a small tree of the sub Himalayan tract from Kumaun to Assam, Eastern Bengal, Chittagong and Burma It is important as being a tree upon whose leaves as well as on those of the Castor Oil plant, the "Eri silkworm of Assam ... Th , is an evergreen

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Wood white, generally soft Pores small, often arranged in concentric bands Medullary rays distant, broad or moderately broad, generally several lines of pores between two rays

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Eastern Himalaya above 7 000 feet, Khasia Hills

A curious shrub with simple leaves and flowers in umbels from the centre of the leaves, like those of *Ruscus*

E 3312 Darjeeling, 7,000 feet

2 HEPTAPLEURUM, Gaertn

Contains abc ... 2 in Burma and ... Ind ii 728 ...

Gamble 44 ... Nep , is a climbing shrub or small tree of most parts of India

1. H elatum, C B Clarke, Hook. Fl Ind ii 728, Gamble 44. Vern *Chinia*, Nep , *Prongzam*, Lepcha

A tree. Bark ¼ in thick, greyish brown Wood white, soft Structure similar to that of *Macropanax undulatum*

Himalaya, from Kumaun to Bhutan, between 5,000 and 7,000 feet.

E 3326 Rangirum, Darjeeling, 6,000 feet

3. BRASSAIOPSIS, Dcne and Planch.

Contains several small palm like trees of the Eastern Himalaya, Eastern Bengal and Burma *B palmata* Kurz i. 537, is found in the forests of Chittagong and the Andamans and *B Hainla* Seem , Hook Fl Ind ii 735, Gamble 44. Vern *Tilhetter*, Nep , *Suntong*, Lepcha is a common small tree in the forests of the outer Sikkim Himalaya

1. B. mitis, C. B. Clarke; Hook. Fl. Ind. ii. 736. *B.* sp.; Gamble 44. Vern. *Moqchini*, Nep.; *Suntong*, Lepcha.

A small tree with thin grey bark, and soft, white, spongy wood. Pores small, in groups and undulating lines. Medullary rays short, broad and very fine, marked on a radial section as shining plates.

Sikkim Himalaya, above 5,000 feet, common at Darjeeling.
Growth moderately fast, 5 rings per inch of radius. Weight, 24 lbs. per cubic feet.

		lbs.
E 2382.	Rangbúl Forest, Darjeeling, 7,000 feet	24

4. MACROPANAX, Miq.

Besides the species described, *M. oreophilum*, Miq.; Kurz i. 541, is an evergreen tree of the forests of the Martaban Hills above 5,000 feet.

1. M. undulatum, Seem.; Gamble 45. Vern. *Chinia*, Nep.; *Prongzam*, Lepcha.

A moderate-sized evergreen tree; wood soft, yellowish white, even-grained. Pores small, numerous. Medullary rays broad, often with a few fine rays intervening, prominent on a radial section as shining plates giving the wood an elegant reticulate appearance. The distance between the rays is many times larger than the diameter of the pores, there being many lines of pores between each pair of rays.

Eastern Himalaya, up to 5,000 feet.
Weight, 30 lbs. per cubic foot.

		lbs.
E 688.	Chuttockpur Forest, Darjeeling, 6,000 feet	30

5. HEDERA, Linn.

1. H. Helix, Linn.; Brandis 248; Gamble 45. The Ivy. Vern. *Halbambar, arbambal*, Jhelum; *Karmora, mandia*, Kashmir; *Kurol*, Chenab; *Kuri, karúr*, Ravi; *Brúmbrúm, dakári*, Beas; *Karbaru, kaniúri, kadeoli*, Sutlej; *Bánda*, Kumaun; *Dudela*, Nep.

A large woody climber. Wood white, soft, porous. Annual rings marked by a broad belt of pores and by less numerous pores in the autumn wood. Pores small, very numerous. Medullary rays short, moderately broad.

Himalaya from the Indus to Bhutan, between 3,000 and 9,000 feet; Khasia Hills.
Growth slow, 22 rings per inch of radius. Weight, our specimen gives 34 lbs.; Mathieu Fl. For. p. 174, gives 27 to 44 lbs.

		lbs.
H 69.	Mashobra, Simla, 7,000 feet	...
H 3010.	Kotgarh, Simla, 7,500 feet	34

ORDER LIV. CORNACEÆ.

Contains 7 Genera of Indian trees or shrubs. They are generally dispersed over India, but are chiefly found in the Himalayas. They may be divided into two sections—

Section I.—With hermaphrodite flowers . *Alangium, Marlea, Cornus* and *Mastixia*.
„ II.—With diœcious flowers . . *Aucuba, Nyssa* and *Torricellia*.

Mastixia arborea Wight, Beddome t 216 is a tree of the forests of the Western Ghâts between 2 000 and 7 000 feet *Torricellia tiliæfolia* DC Gamble 15 is a small tree of the Eastern Himalaya between 6 000 and 10 000 feet *Nyssa sessiliflora*, Hook f and Th is found in the Eastern Himalaya and Khasia Hills

Wood close grained, apt to warp Pores generally small or very small Medullary rays fine and numerous

1 ALANGIUM, Lam

Contains two species one of which is here described *A Sundaicum* Miq Vern *Agnara* And is an evergreen climbing shrub of the tropical forests of the Andamans

1 A. Lamarckii, Thwaites, Beddome t 215, Brandis 250. *A hexapetalum*, Roxb Fl Ind ii 502 *A decapetalum*, Lam, Kurz i 543 Vern *Akola, thaila*, Hind, *Akar-kanta, bagh ankurá*, Beng, *Alangi*, Tam, *Urgu, udagu*, Tel, *Ankola*, Kan, *Uru*, Gondi

A deciduous shrub or small tree Bark ½ inch thick, grey. Sapwood light yellow, heartwood brown, hard, close and even-grained Pores small, scanty, in radial lines between the fine, closely packed medullary rays, which often bend outwards, the transverse diameter of the pores being slightly larger than the distance between the rays

Sub-Himalayan tract from the Ganges eastwards Oudh Bengal Central and South India

[illegible] Weight according to Skinner, [illegible] Skinner gives P = 870 [illegible] ells and other purposes [illegible] aten and the bark used in native medicine

		lbs.
C 3116	Chanda Central Provinces	50
D 1082	North Arcot Madras	49

2 MARLEA, Roxb

Besides the species here described *M tomentosa* Endl, Kurz i 545 Vern *Goraponqse* Burm., is a large evergreen tree of the tropical forests of Martaban said by Kurz to have a pale brown close grained wood with a silvery lustre

1 M begoniæfolia, Roxb Fl Ind ii 261, Brandis 251, Kurz i 544, Gamble 15 Vern *Garkum, budhal, túmbri*, North-Western Provinces, *Bodara*, Beas, *Sialu*, Chenab, *Prot*, Kashmir, *Tilpattri, chilpattra, kurkui*, Jhelum, *Tumri*, Kumaun, *Timil*, Nep, *Palet*, Lepcha, *Taipuya*, Burm, *Marlea, marli-a*, Sylhet

A small tree, with smooth, thin, grey bark Wood white, soft, even-grained Annual rings marked by a belt of numerous pores Pores moderate sized and large, small in the outer portion of each ring Medullary rays short, wavy, fine and moderately broad, prominent on a radial section

Outer Himalaya from the Indus to Bhutan ascending in the North West to [illegible] feet and in Sikkim to 9 000 feet, Khasia Hills Eastern Bengal Chittagong and Martaban

Growth moderately fast 5 rings per inch of radius Weight 42 lbs per cubic foot

The wood is used for native houses in Sylhet. The leaves are sometimes given as fodder to cattle.

		lbs.
H 2831.	The Glen, Simla, 6,000 feet	42

3. CORNUS, Linn.

Besides the three species here described, *C. sanguinea*, Linn.; Brandis 253, the Dogwood, was found by Dr. Stewart in the Punjab Himalaya at 7,000 feet.

Numerous small pores and numerous fine medullary rays, often of different width.

1. C. macrophylla, Wall.; Brandis 252; Gamble 45. Vern. *Kasír, kachír, haleo, allian, haddú, harru, nang, kandara, kaksh, kachúr, kochan, kágsha, rúchia*, Hind.; *Patmoro*, Nep.

A small tree, with rough, brown bark, splitting into small squares. Wood pinkish white, hard, close-grained, warps badly and has an unpleasant scent. Annual rings marked by a narrow line without pores, on the outer edge of each ring. Pores small, numerous. Medullary rays short, moderately broad, with fewer fine rays, giving the wood on a radial section a beautifully mottled appearance.

Himalaya from the Indus to Bhutan, between 3,000 and 8,000 feet.

Growth moderate, 8 to 9 rings per inch of radius (Brandis); our specimens had 15 rings. Weight, 41 lbs. per cubic foot. The wood gives good gunpowder charcoal. The fruit is eaten and the leaves given as fodder to goats.

		lbs.
H 84.	The Glen, Simla, 6,000 feet	45
H 924.	Hazara, 6,000 feet	43

2. C. oblonga, Wall.; Brandis 253; Kurz i. 545. Vern. *Kagshi*, Sutlej; *Dab*, Kunawar; *Kasmol, bakár, ban-bakúr, halá*, Hind.

A small tree, with reddish brown, rough bark. Wood pinkish white, hard, even-grained, warps and has an unpleasant scent. Annual rings marked by a belt without pores at the outer edge of each ring. Pores small, numerous. Medullary rays fine, very numerous, with a few slightly broader ones.

Outer Himalaya from the Indus to Bhutan, between 3,000 and 6,000 feet; Martaban Hills in Burma, between 4,000 and 7,000 feet (Kurz).

Growth moderate, 10 rings per inch of radius. Weight, 48 lbs. per cubic foot.

		lbs.
H 150.	Sainj, Giri Valley, 4,000 feet	46
H 3094.	Tarwa Forest, Julung, Simla, 4,000 feet	50

3. C. capitata, Wall.; Brandis 253; Gamble 45. *Benthamia fragifera*, Lindley. Vern. *Thammal, tharbal, tharwar, thesi, bamaur, bamora*, Hind.; *Tumbúk*, Lepcha.

A small deciduous tree, with thin, greyish brown bark. Wood whitish, with reddish brown heartwood, warps in seasoning, very hard, close-grained. Pores very small. Medullary rays numerous, moderate-sized and fine.

Himalaya from the Beas to Bhutan, between 3,500 and 8,000 feet; Khasia Hills.

Growth slow, 16 rings per inch of radius. Weight, 45 lbs. per cubic foot. The wood is used only for firewood. This is probably the *Cornus, sp.*, of whose wood 5

[illegible] 1865 (Bengal Forest Report [illegible] ve no record The fruit [illegible] The tree is very hand- [illegible]

		lbs
H 78	Mashobra Simla 7,000 feet	
H 94	Simla, 6 000 feet	45

4 AUCUBA, Thunb

Contains one large shrub or small tree of the Eastern Himalaya *A japonica*, Thunb is a well known shrub of English gardens, recognised by its shining leaves, blotched with yellow

1. A. himalaica, Hook f and Th , Brandis 254, Gamble 45 Vern. *Phul amphi*, Nep , *Singna, tapathyer*, Lepcha

A small evergreen tree, with thin, smooth, dark-grey bark Wood black when fresh cut, becoming lighter-coloured on exposure, hard and close grained Pores extremely small Medullary rays of two classes, numerous fine rays between fewer broad or very broad ones, visible on a radial section as irregular plates and bands

Sikkim Himalaya between 5 000 and 9 000 feet

Growth slow, 20 rings per inch of radius (Gamble), one specimen E 3327, shews 10 rings Weight, 55 lbs per cubic foot

		lbs
E 2383	Rangbul Forest, Darjeeling 7 000 feet	55
E 3327	Rangirum " " 6 000 "	

Order LV CAPRIFOLIACEÆ.

Contains 6 genera belonging to the two following tribes —

Tribe I —Sambuceæ	*Sambucus* and *Viburnum*
" II —Loniceræ	*Abelia, Lonicera Leycesteria* and *Pentapyxis*

Wood close-grained Pores very small or extremely small, uniformly distributed Medullary rays fine to extremely fine, numerous

1. SAMBUCUS, Linn.

Contains 3 Indian species *S Ebulus* Linn , Brandis 260 The Dwarf Elder Vern *Richh kas mushki ira ganhula* Jhelum *Gand il gwandish siske tas ir*, Chenab, [illegible] um [illegible] ect

1. S javanica, Reinw., Gamble 16. Vern *Galens*, Nep

A small tree Bark light brown, rather corky Wood white, soft Pores small, in groups Medullary rays distant, fine to broad Pith large, about ½ inch in diameter

Eastern Himalaya from 4 000 to 8 000 feet, Khasia Hills Chiefly found in second growth forest

E 3133 Mangwa Forest Darjeeling 5 000 feet

2. VIBURNUM, Linn.

Contains about 15 species, mostly Himalayan. Three species occur in the Nilgiris, seven in the North-West Himalaya, and about twelve in the Eastern Himalaya and Khasia Hills.

V. corylifolium, Hook. f. and Th.; Gamble 46, is a small tree of Sikkim and the Khasia Hills. *V. nervosum*, Don; Brandis 259. Vern. *Ambre, amrola, ari*, Ravi; *Rís, dáb*, Beas; *Thilkain, thalein*, Sutlej, is a shrub of the Himalaya above 7,000 feet, from Kumaun to Sikkim. *V. cordifolium*, Wall. and *V. punctatum*, Ham.; Beddome t. 217; Brandis 260; Gamble 46, are shrubs of the Outer Himalaya from Kumaun to Bhutan, the latter occurring also in the Western Ghâts. *V. involucratum*, Wall.; Gamble 46, Vern. *Gorakuri*, Nep., is a shrub of the Himalaya, chiefly eastern. *V. fœtidum*, Wall., *V. odoratissimum*, Ker, and *V. Simonsii*, Hook. f. and Th., are all from the Khasia Hills. *V. hebanthum*, W. and A.; Beddome cxxiv., is a small tree of the Western Ghâts and Ceylon.

The Guelder Rose, cultivated in gardens in Europe, is *V. Opulus*, Linn., and the Laurustinus is *V. Tinus*, Linn., indigenous in the Mediterranean region.

Bark thin. Wood hard and close-grained, characterised by very numerous, very fine medullary rays and very small pores. Annual rings indistinctly marked, generally by a narrow line of firmer wood. The wood of *V. lutescens* is softer, the pores larger, and the annual rings not visible.

All species here described, with the exception of *V. erubescens* and *V. lutescens*, are marked by distinct and numerous medullary patches, visible on the horizontal and vertical sections. The European species, both those with deciduous leaves, *V. Opulus* and *V. Lantana*, and the evergreen *V. Tinus* have no medullary patches.

1. V. cotinifolium, Don; Brandis 258. Vern. *Mar ghwalawa*, Trans-Indus; *Rich úklu, bankúnch*, Jhelum; *Richabi, kilmich, gúch*, Kashmir; *Bathor, pápat kalam, khímor, rájal, tumma*, Chenab; *Kátonda*, Ravi; *Jawa, khatip, tústús, sússú*, Sutlej; *Gwia, guya*, Kumaun.

A large deciduous shrub, with greyish brown bark, $\frac{1}{6}$ inch thick. Wood white, hard to very hard, close-grained. Pores very small, uniformly distributed. Medullary rays fine and very fine, extremely numerous. On a horizontal section are seen linear, concentric, but short and interrupted patches of soft tissue, which shew on a vertical section as undulating lines of darker colour and of varying length.

Suliman Range, North-West Himalaya, between 4,000 and 11,000 feet.
The ripe fruit is eaten.

H 52. } Nagkanda, Simla, 8,000 feet.
H 2869. }
H 76. Mashobra, „ 7,000 „

2. V. Mullaha, Ham.; Brandis 258, 576. *V. stellulatum*, Wall. Vern. *Jal bágú*, Jhelum; *Amliacha, phulsel*, Kashmir; *Lal titmaliya*, Kumaun; *Eri, ira*, Simla.

A shrub. Bark dark grey, reticulate. Wood white, moderately hard; structure the same as that of *V. cotinifolium*.

North-West Himalaya from 6,000 to 10,000 feet. Fruit eaten.

H 2834. The Glen, Simla, 6,000 feet.
H 2866. Nagkanda, „ 8,000 „

3. V. coriaceum, Bl.; Brandis 259; Gamble 46. Vern. *Kala titmaliya*, Kumaun; *Bara gorakuri*, Nep.

A large shrub or small tree Bark grey brown, rather corky Wood similar to that of *V cotinifolium*, but the pores larger and the medullary rays slightly broader

Himalaya from the Sutlej to Bhutan at 4 000 to 8 000 feet Khasia Hills Nilgiris and Ceylon

Weight 50 lbs per cubic foot The Nepalese are said to extract from the seeds an oil which they use for food and for burning

		lbs
H 2835.	The Glen Simla 6 000 feet	50

4 **V. erubescens,** Wall , Beddome cxxiv , Brandis 258 , Gamble 46 Vern *Ganné*, Nep , *Kancha*, Lepcha , *Damshing*, Bhutia

A small tree, with thin grey bark Wood very hard, reddish, close and even-grained Pores very small Medullary rays undulating, fine and very fine, very numerous No medullary patches

Himalaya from Kumaun to Bhutan between 5 000 and 11 000 feet Nilgiris and Ceylon

Weight 59 lbs per cubic foot The wood might do as a substitute for boxwood and for carving Used for house posts in Sikkim It grows well and quickly from cuttings

		lbs.
F 2381	Rangbul Darjeeling 7 000 feet	59

5 **V lutescens,** Bl , Kurz ii 2 Gamble 46

A large shrub Bark greyish brown, thin Wood reddish, soft Pores moderate sized, very numerous Medullary rays fine very numerous Annual rings not visible

Terai and Lower Hills of Sikkim Assam Khasia Hills in damp evergreen forests

E 3273 Muraghat Reserve W Duars

6 **V fœtens,** Decaisne , Brandis 259. Vern *Guch* [illegible]*llu*, *lunch*, Jhelum , *Kilmich*, *guch*, *kwilim*, *kulira*, *jamara*, Kashmir , *Tilhary*, *pulim*, *tilats*, *tuin*, Chenab , *Talhang*, *tanlei*, *tu*[illegible]*lhe*, *tu*[illegible] *zen*[illegible], Ravi , [illegible] Sutlej , *Girya*, Kumaun

A [illegible] white, hard to very hard close g[illegible]e and structure to that of *V cotinifolium*

North West Himalaya from 5 000 to 11 000 feet

Weight 53 lbs per cubic foot Fruit eat[illegible]

			lbs
H	53	Narkanda Simla 8 000 feet	51
H	2886	[illegible]	
H	3015	Matiyána	
E	975	Chumbi Valley Tibet 10 000 feet	

3 ABELIA, Brown.

1 **A triflora,** R Brown , Brandis 257 Vern *Idei*, *piklawar* Trans Indus , *Chela bila*, Jhelum , *Ban lakhara*, *salinker*, Chenab , *D*[illegible], *L*[illegible]*sai*, Ravi , *Llang*, *ral lang*, *peni*, Sutlej , *Unuri*, *goralli*, *kumli*, Kumaun

A large shrub. Bark grey, with longitudinal fissures. Wood greyish or bluish white, hard, close and even-grained. Pores extremely small, except those at the edge of each annual ring, which are small and continuous. Medullary rays very numerous, moderately broad and very fine, the former short.

Safedkoh and Suliman Range, North-West Himalaya, between 4,000 and 10,000 feet.
Has very pretty flowers, but the wood is not used. Weight, 65 lbs. per cubic foot.

		lbs.
H 2937.	Naldehra, Simla, 7,500 feet	65

4. LONICERA, Linn.

Contains 26 species, 21 of which are erect and 5 climbing. They are mostly small shrubs of the Himalaya, 2 only being found in the Nilgiris and Western Gháts. The Himalayan species are mostly from high altitudes, some occurring only in Tibet. *L. spinosa*, Jacquemont; Brandis 255, is a small rigid shrub of the inner arid Himalaya. *L. hypoleuca*, Decaisne, Brandis 256. Vern. *Kharmo, lodi*, Chenab; *Zhiko, rapesho*, Sutlej, is a small shrub of the Inner Himalaya. *L. Myrtillus*, Hook. f. and Th., is a shrub of the Inner Himalaya from the Indus to Sikkim, from 9,000 to 12,000 feet. *L. ligustrina*, Wall.; Beddome cxxiv., is a shrub, common on the Nilgiris, where it is used as a hedge-plant: it is also found in the Himalaya. Of the climbing species, *L. japonica*, Thunb.; Gamble 46. Vern. *Duari lara*, Nep.; and *L. glabrata*, Wall.; Gamble 45. Vern. *Betlara*, Nep. (No. E 2863. Tukdah, Darjeeling, with a soft brown wood, large pores and the structure of a climber) come from the Eastern Himalaya; while *L. Leschenaultii*, Wall., grows in the Malabar hills from 5,000 to 7,000 feet. The European Honeysuckle is *L. Periclymenum*, Linn.

1. **L. quinquelocularis**, Hardwicke; Roxb. Fl. Ind. i. 537; Brandis 255. Vern. *Jarlangei, adei*, Trans-Indus; *Phút*, Jhelam; *Tita bateri, pákhur*, Kashmir; *Bakhru*, Chenab; *Khóm, sái*, Ravi; *Dendra*, Beas; *Kliunti, kraunti, takla, zbang, razbam, bhajra, bhijaul, bijgai*, Sutlej; *Bet kukri, bhat kukra, cheraya, kurmali*, Kumaun.

A large deciduous shrub. Bark thin, grey, with longitudinal fissures, peeling off in long shreds. Wood white, with a brown centre, very hard and close-grained. Annual rings marked by a narrow continuous belt of pores; in the remainder of the annual ring the pores are extremely small. Medullary rays short, fine, numerous.

Suliman Range, North-West Himalaya, between 2,500 and 9,000 feet.
Used only for firewood. Cattle are fed on the leaves. Weight, 52 lbs. per cubic foot.

		lbs.
H 81.	Mashobra, Simla, 7,000 feet	...
H 2874.	Nagkanda, „ 8,000 feet	52
H 3180.	Dungagalli, Hazara, 7,000 feet	...

2. **L. orientalis**, Lamarck; Brandis 256.

A shrub. Bark peeling off in thin flakes. Wood white, with a darker centre, moderately hard. Structure the same as that of *L. quinquelocularis*.

North-West Himalaya, from Kashmir to Kumaun, 8,000 to 10,000 feet.

H 2909. Nagkanda, Simla, 8,000 feet.
H 3017. Hattu, Simla, 10,000 feet.

3 L angustifolia, Wall , Brandis 255 Vern *Geang,* Jaunsar, *Pilru, phalku* Sutlej

A small shrub, with smooth, grey bark, exfoliating in broad flakes Wood white, very close grained Structure similar to that of *L quinqueloculaiis,* but pores much smaller

Himalaya from the Indus to Sikkim 6 000 to 10 000 feet Fruits eaten Weight 60 lbs per cubic foot

H 2813	Mahasu Simla 8 500 f et		lbs 60
H 2875	Nagkanda Simla 8 000 feet		

4 L alpigena, Linn , Brandis 256

A shrub Bark grey brown, peeling off in irregular papery flakes Wood moderately hard, structure similar to that of *L quinqueloculaıis*

North West Himalaya from Kashmir to Kumaun 8 000 to 10 000 feet

H 2912 Nagkanda Simla 8 000 feet
H 3016 Hattu Simla 10 000 feet

5 LEYCESTERIA, Wall

1 L formosa, Wall , Brandis 256 Gamble 16 Vern *Mallarr, saunjla, nalkaru, karnaliya,* Kumaun *Tungul,* Lepcha

An erect shrub with hollow, generally herbaceous stems Bark grey, shining Wood resembling in structure that of *Lonicera,* but with slightly broader medullary rays

Throughout the Himalaya from the Sutlej to Bhutan from 5 000 to 10 000 feet
H 2819 Mahasu Simla 8 000 f e

6 PENTAPYXIS, Hook f

Contains 2 species P *glaucophylla* Hook f is a shrub of the Sikkim Himalaya from 5 000 to 9 000 f et

1 P. stipulata, Hook f, Gamble 45 *Lonicera stipulata,* Hook f and Th in Journ Linn Soc ii 165 Vern *Berilaru* Nep

A large shrub, with greyish brown bark Wood white, soft Pores extremely small Medullary rays fine and very fine No annual rings

Sikkim Himalaya, from 6 000 to 10 000 feet very common on hill sides cleared of forest around Darjeeling

F 2866 Pangbul Darjeeling 7 000 f et

ORDER LVI RUBIACEÆ

A large and very important forest Order containing many trees which are valuable for their timber besides plants which have valuable properties chiefly as medicines and dyes. It contains 41 Genera divided into 13 Tribes viz —

Tribe I — Naucleæ . *Sarcocephalus Anthocephalus Cephalanthus Adina Stephegyne Nauclea* and *Cactina*

Tribe	II.—Cinchoneæ	*Cinchona*, *Hymenopogon*, *Hymenodictyon* and *Luculia*.
„	III.—Rondeletieæ	*Wendlandia*.
„	IV.—Hedyotideæ	*Hedyotis*.
„	V.—Mussændeæ	*Mussænda*, *Adenosacme*, *Myrioneuron* and *Urophyllum*.
„	VI.—Gardenieæ	*Byrsophyllum*, *Webera*, *Randia*, *Gardenia*, *Hypobathrum*, *Petunga*, *Morindopsis*, *Hyptianthera* and *Diplospora*.
„	VII.—Retiniphylleæ	*Scyphiphora*.
„	VIII.—Guettardeæ	*Guettarda* and *Timonius*.
„	IX.—Vanguerieæ	*Plectronia* and *Vangueria*.
„	X.—Ixoreæ	*Ixora*, *Pavetta* and *Coffea*.
„	XI.—Morindeæ	*Morinda* and *Gynochthodes*.
„	XII.—Psychotrieæ	*Psychotria*. *Chasalia*, *Lasianthus*, *Saprosma* and *Hydnophytum*.
„	XIII.—Pæderieæ	*Pæderia*, *Hamiltonia* and *Leptodermis*.

Sarcocephalus cordatus, Miq.; Beddome t. 318; Kurz ii. 63 (*Nauclea cordata*, Roxb. Fl. Ind. i. 508). Vern. *Maoolet-tan-shay*, Burm.; *Bakmi*, Cingh., is a deciduous tree of Burma and Ceylon, with a light, soft, perishable wood. weighing 23 to 34 lbs. per cubic foot. Beddome says it is used for sandals, common furniture, doors and other purposes. *Cephalanthus naucleoides*, DC.; Kurz ii. 68, is a small tree of Upper Burma. *Uncaria* contains several scandent shrubs, *U. pilosa*, Roxb. Fl. Ind. i. 520; Kurz. ii. 70; Gamble 47. Vern. *Baisi kara*, Nep.; *Kahukrik*, Lepcha, is a straggling shrub of Sikkim, Eastern Bengal and Burma, with large hooked sterile peduncles of the shape of a buffalo's horn, and handsome globular flower heads. *U. sessilifructus*, Roxb. Fl. Ind. i. 520; Kurz ii. 71; Gamble 47. Vern. *Pinri*, Lepcha, is a climber of Sikkim, Eastern Bengal, Chittagong and Burma. Kurz gives also *U. ferruginea*, DC., *U. sessilifolia*, Roxb., and *U. lævigata*, Wall., as climbing shrubs of Burma; while *U. Gambier*, Hunter; Roxb. Fl. Ind. i. 517; Beddome cxxix., is a scandent shrub of Ceylon and the Malay Archipelago, whose leaves produce the astringent extract called "Gambier," or "Terra japonica," which is used for chewing with pán leaves and areca nut in the same way as cutch in India, and of which large quantities are prepared and used throughout the Malay Archipelago.

Hymenopogon parasiticus, Wall.; Kurz ii. 73; Gamble 47. Vern. *Kursimla*, Nep., is an epiphytic shrub of the North-East Himalaya and Burma. *Luculia gratissima*, Sweet. Kurz ii. 71; Gamble 47. Vern. *Dowari*, Nep.; *Simbrangrip*, Lepcha, is a large shrub with handsome long-tubed pink flowers, found in the hills of Sikkim and in Upper Burma. Its leaves are used in dyeing. Weight 23 lbs. (Wallich, No. 43).

Hedyotis contains only small climbing shrubs. They are very numerous, and many of the species are used in dyeing.

Mussænda contains about 7 large shrubs remarkable for having one of the lobes of the calyx enlarged into a membranous, usually white leaf. *M. frondosa*, Linn.; Roxb. Fl. Ind. i. 557; Beddome cxxi.; Gamble 48. Vern. *Asari*, Nep; *Tumberh*, Lepcha; *Maasenda*, Cingh., is a handsome shrub of the North-East Himalaya, Bengal, South India and Burma, with yellow flowers and large white calycine leaf, often cultivated in gardens. *M. macrophylla*, Wall.; Kurz ii. 57; Gamble 48, is a small tree of second-growth forest in the Sikkim Himalaya; also found in the Andamans. Kurz mentions 5 other species as occurring in Burma. *Adenosacme* [illegible], Wall.; Kurz ii. 54; Gamble 48. Vern. *Pitamari*, Nep., is a shrub of the [illegible] Burma, remarkable for its pretty snow-white berries. *My*[illegible], R. Br.; Kurz ii. 55, is a shrub of Chittagong. *Urophyllum* contains 3 shrubs or small trees of Martaban and Tenasserim and 2 small trees of Ceylon.

Byrsophyllum tetrandrum, Beddome t. 326, is a small tree of the hills of Travancore. *Hypobathrum racemosum*, Kurz ii. 51 (*Randia racemosa*, Roxb. Fl. Ind. i. 525) Vern. *Peetunga*, Beng., is a shrub of Eastern Bengal and of the swamp forests of Pegu and Arracan. *Petunga Roxburghii*, DC. Vern. *Jhijir*, Beng., is a small tree of

the Sundarbans with hard white wood, and *Morindopsis capillaris*, Kurz, a tree of Pegu, Martaban and Tenasserim *Hyptianthera stricta*, W. and A.; Brandis 274 (*Hypobathrum strictum*, Kurz ii 50, *Randia stricta*, Roxb Fl Ind i 526), is an evergreen shrub of Oudh, Northern Bengal, Chittagong and Burma *Diplospora singularis*, Korth; Kurz ii 56 (? No B 1998, Andamans Vern. *Thitloo*, with white wood ... 36 lbs), is a tree of

... 4, is a small

... 1987, Anda-
... it, 48 lbs), is

... *Toa ranga*,
... Kyd calls it
... i 626, Kurz
ii 34; Gamble 19 Vern *Hsay ma kyee*, Burm, is a thorny small tree of Bengal and Burma; and *V pubescens*, Kurz ii 34, a tree of the Eng and dry forests of Burma.

Gynochthodes macrophylla, Kurz, is a scandent shrub of the coasts of South Andaman

Psychotria and *Lasianthus* contain a large number of small evergreen shrubs of Bengal, Burma and South India. *Chasalia curviflora*, Thw, Kurz ii, 14, Gamble 19 Vern. *Antabi*, Lepcha, is a small shrub of the hills of Northern Bengal, Burma and Ceylon. *Saprosma* contains 4 shrubs of South India and 2 of Burma. *Hydnophytum formicarum*, Jack, Kurz ii 8, is a small epiphytic shrub with an enlarged tuber-like trunk found on trees in the swamp forests of the Andamans

Pæderia contains several shrubs or climbers *P lanuginosa*, Wall, Kurz ii. 76, is a large climber of the forests of Burma, and *P fœtida*, Willd, Roxb Fl Ind i. 683; Gamble 19 Vern. *Gundha badhuli*, Beng., *Gandali*, Hind, *Padebiri*, Nep; *Talpœdrik*, Lepcha, is a thin climber of Bengal and Burma, with handsome flowers, and fruit which is said to be used in Sikkim by Nepalese and Lepchas to blacken the teeth, and prevent toothache. *Hamiltonia suaveolens*, Roxb Fl Ind i 554, Beddome cxxxiv 12, Brandis 278, Gamble 19 Vern *Muskei, kantalu, fisauni*, Chenab, *Niggi, tulenni phul, gohinla*, Ravi, *Kanera, puddri*, Beas, *Phillu*, Sutlej, *Padera*, Kumaun, *Bainchampa*, Nep, is a shrub of the North-West Himalaya, Sikkim (rare), Behar, Central and South India, with handsome lilac flowers, the wood is said by Brandis to be used in Chamba to make gunpowder charcoal

Besides the genera described from India, which include such important ones as *Cinchona*, *Coffea* and *Morinda*, many genera contain plants of economic use *Cephaëlis* ... a plant which has been largely propagated in
... a way as to
... , the *Manjit*
... other genera
... e commonest
... *Ixoras* and

Wood white, yellow, or rarely red, close-grained, generally soft or moderately hard; no heartwood. Pores small or very small; in *Anthocephalus Cadamba* and a few other species, moderate-sized. Medullary rays uniform, equidistant, fine or very fine, very numerous, often closely packed.

The species which were formerly united under the old genus *Nauclea*, genera Nos. 1 to 4, have an exceedingly uniform structure. The wood seasons well, is soft, but close and even-grained. Pores numerous, small to moderate-sized. Medullary rays fine, very numerous

1. ANTHOCEPHALUS, A. Richard.

1. A. Cadamba, Bth. and Hook f.; Brandis 261, Gamble 16. *Nauclea Cadamba*, Roxb Fl. Ind i. 512, Beddome t. 35. *Sarcocephalus*

Cadamba, Kurz ii. 63. Vern. *Kaddam, karam*, Hind., Beng.; *Bol-kadam*, Chittagong; *Pandúr*, Lepcha; *Kodum*, Mechi; *Roghu*, Ass.; *Kadambo*, Uriya; *Vella cadamba*, Tam.; *Kadambe, rudrak-shamba*, Tel.; *Heltega, arsanatega*, Mysore; *Kadam*, Mar.; *Kadda vailu, kadaga, kadwal*, Kan.; *Halamba*, Cingh.; *Maoo, sanyepang*, Magh; *Maoo, maookadoon*, Burm.

A large deciduous tree. Bark grey, with numerous regular, longitudinal fissures. Wood white, with a yellowish tinge (an old specimen from Burma, yellowish grey), soft, even-grained. Pores large, oval, elongated, subdivided, sometimes in short radial lines. Medullary rays fine, numerous, close together, bent outwards where they touch the pores.

Wild in Northern and Eastern Bengal, Pegu and the Western Coast; cultivated in Northern India.

Growth variable, 5 to 15 rings per inch of radius, average moderate, 9 rings per inch. The weight and transverse strength have been determined by the following experiments:—

Experiment by whom made	Year	Wood whence procured	Weight.	Number of experiments.	Size of scantling.	Value of P.
			lbs		Ft. In. In.	
Puckle, No 19	1829	Mysore	43	2	2 × 1 × 1	616
Kyd .	1831	Assam	33		2 × 1 × 1	560
Cunningham	1854	Gwalior	47	5	2 × 1 × 1	618
Brandis, No 67 . .	1862	Burma	37		...	......
Wallich		Travancore	38		.	......
Smythies . . .	1874	Bengal	40	2	...	......
"	"	Assam	32	1	.	......

Wood used for building, in Assam, Cachar and occasionally in Darjeeling for tea-boxes. Cunningham (1854) says that it is used for beams and rafters on account of its cheapness and lightness, and that it is good for joiner's work, but that it is a brittle wood. The flowers are offered at Hindu shrines and the fruit eaten. It is often cultivated for ornament, and is very much used as an avenue tree in Bengal. Kurz, evidently quoting Brandis' 1862 List, No 67, says "wood, a deep yellow;" this is not, however, the case with our specimens, and it may be suggested for investigation whether the Burma wood has not a more yellow colour than the Indian.

		lbs.
E 650	Rakti Forest, Darjeeling Terai	40
E 3153	Pankabari, Darjeeling (damp)	50
E 3144	Julpigori, Bengal	40
E 1435.	Assam	32
B 2535	Burma (1862)	32

2. ADINA, Salisbury.

Contains 3 Indian species. *A polycephala*, Hook. f. and Bth. (*Nauclea polycephala*, Wall, Kurz ii 65), is a small evergreen tree of Chittagong and Tenasserim.

1. **A. cordifolia**, Hook. f. and Bth.; Brandis 263; Gamble 46. *Nauclea cordifolia*, Roxb. Fl. Ind. i. 514; Beddome t. 33; Kurz ii. 66. Vern. *Haldu, hardu, karam*, Hind.; *Bangka, keli-kadam, petpuria, da-kôm*, Beng.; *Karam*, Nep.; *Tikkoe*, Bahraich and Gonda; *Hardu, paspu, kurmi*, Gondi; *Holonda*, Uriya; *Shangdong*, Gáro; *Roghu*, Ass.; *Manja-kadambe*, Tam.; *Bandaru, dúdagú, paspu kadambe*, Tel.; *Hedde, yettéga, pettega, arsanatéga, yettada, ahnau*, Kan.; *Hedu*, Mar.; *Kolong*, Cingh.; *Thaing*, Magh; *Hnaubeng*, Burm.

A large deciduous tree. Bark soft, ½ inch thick, grey, rough. Wood yellow, moderately hard, even-grained. No heartwood, no annual rings.

Pores small, numerous, uniformly distributed, more numerous and more closely packed than in *Stephegyne parvifolia.* Medullary rays very fine, of uniform width not prominent, numerous, distinctly visible on a radial section, finer and more uniform in width than those of *S parvifolia.*

Sub-Himalayan tract from the Jumna eastwards, ascending to 3 000 feet, throughout the moister regions of India Burma

The weight and transverse strength have been determined by the following experiments —

Experiment by whom made	Year	Wood whence procured.	Weight	Number of experiments	Size of bar	Value of P
			lbs		Ft In In	
Puckle No 76	1850	Mysore	36	4	2 × 1 × 1	464
Skinner No 99	1862	South India	42			604
Cunningham	1854	Gwalior	49	•	2 × 1 × 1	5 6
Brandis	1864	Burma	43	7	3 × 1 × 1	700
Brandis No 65	1862	,	4[illegible]			
R Thompson	1868	Central Provinces	47			
C P List	1873	,	42			
Smythies	18 8	Different Provinces	45	11		--

The wood seasons well takes a good polish and is durable, but somewhat liable to warp and crack It is good for turning and is extensively employed in construction, for furniture agricultural implements, opium boxes writing tablets, gun stocks, combs and occasionally for dug out canoes

			lbs
O 215	Garhwal (1868)	.	43
O 2991	, (1874)	. .	46
O 1491	Kheri Oudh		48
O 340	Gorakhpur		41
C 825	Bairagarh Reserve, Berar		48
C 2988	Jubbulpore (1863)		43
C 1136	Ahiri Reserve, Central Provinces	.	44
C 1215	Gumsur Madras	.	49
E 2387	Bamunpokri Darjeeling Terai	.	50
B 2538	Burma (1862)		43
No 35	Salem Collection	.	40

2. **A. sessilifolia**, Hook. f. and Bth , Brandis 264 *Nauclea sessilifolia*, Roxb. Fl Ind i. 515, Kurz ii 65 *Nauclea sericea*, Wall. Vern. *Kum*, Beng , *Kumloi*, Chakma , *Thaing*, Magh , *Teingala*, *thitpayoung*, Burm

Wood yellowish brown, hard Pores very numerous, moderate-sized, oval and subdivided, transverse diameter greater than the interval between the closely packed, fine, and uniform medullary rays

C[illegible] [illegible] 1862 No 70 43 to 66 lbs., our [illegible] wood is used in Chittagong for [illegible] perhaps the only gregarious tree, [illegible] rivers

			lbs.
F 1391	Chittagong .	.	53
B 2537	Burma (1862)	. . . .	56
B 3069	" "	. . . . .	59

3. STEPHEGYNE, Korth.

Contains about 4 species of Indian trees. *S. diversifolia*, Hook. f. and B (*Nauclea diversifolia*, Wall., placed by Kurz under *N. parvifolia*). Vern. *Binga* Burm., is a tree of Burma (weight, 45 lbs., Brandis' Burma List, 1862, No. 66), an *S. tubulosa*, Hook. f. and Bth.; Beddome cxxviii., is a tree of Ceylon.

1. S. parvifolia, Hook. f. and Bth.; Brandis 262. *Nauclea parvi folia*, Roxb. Fl. Ind. i. 513; Beddome t. 34; Kurz ii. 66. Vern. *Kaddam, kallam, keim, kangei*, Hind.; *Phaldu*, Kumaun; *Mundi*, Gondi, Baigas; *Kutebi*, Kurku; *Buta-kadambe*, Tam.; *Nir-kadambe, karmi, bata-ganapu*, Tel.; *Congú, hedu, yetega, kadwar, kadani*, Kan.; *Kadamb, karamb, kalam*, Mar.; *Tamák*, Bhíl; *Helembé*, Cingh.; *Kumra*, Banswara; *Hteinthay*, Burm.

A large deciduous tree. Bark $\frac{1}{3}$ inch thick, light grey, smooth, with shallow depressions left by exfoliating scales. Wood light pinkis brown, moderately hard, generally harder than that of *Adina cordifolia*. No heartwood. Annual rings visible. Pores small, numerous, uniformly distributed. Medullary rays very fine, numerous, not quite uniform in width.

Throughout India and Burma.

Growth moderate, 5 to 15, averaging 9 rings per inch of radius. The weight and transverse strength have been determined by the following experiments:—

Experiment by whom made.	Year.	Wood whence procured.	Weight.	Number of experiments.	Size of bar.	Value of P.
			lbs.		Ft. In. In.	
Cunningham	1854	Gwalior	35	2	2 × 1 × 1	586
Skinner, No. 100	1862	South India	39	..	... ...	683
Brandis, No. 69	1862	Burma	43	..	... ..	...
R. Thompson	1868	Central Provinces	47	..	......	...
Smythies	1878	As below	42·7	11	......	...
. Mendis, No. 35	1855	Ceylon	42	...	... ..	...

The wood is easily worked and polishes well; it is durable, if not exposed to wet. It is used for building, furniture, agricultural implements, combs, cups, spoons and platters, and for turned and carved articles.

P	458.	Ajmere	..
O	269.	Garhwal (1868)	45
O	529.	Dehra Dún	41
O	344.	Gorakhpur	42
O	1481.	Kheri, Oudh	44
C	178.	Mandla, Central Provinces (1870)	42
C	186.	" " "	46
	1120.	Ahiri Reserve, Central Provinces	44
	2783.	Melghát, Berar	44
	561.	Prome	40
	2539.	Burma (1862)	38
	36.	Salem Collection	41
	35.	Ceylon Collection	42

(weights in lb.)

W 1225 (42 lbs , growth moderate, 8 rings per inch of radius) received from . . . . is in structure similar to . . . It is probably *Nauclea*
. . *Ahnau*, Kan

2. S. *Sp* Gamble 46 Vern *Kalé, kalikat*, Nep

A large tree Bark brownish white Heartwood orange yellow, sapwood reddish Wood moderately hard Pores large and moderate-sized, very numerous, filled with a gummy substance Medullary rays fine, very numerous, undulating.

Weight, 44 lbs per cubic foot Used for building.

			lbs
E 2385	Chenga Forest, Darjeeling	. .	44

4 NAUCLEA, Linn

Contains 3 or 4 Indian trees *N elliptica* Dalz, a large tree of the Western Coast has been referred to above *N purpurea* Roxb , Beddome cxxix , is a tree of the Eastern Ghats of South India. Kurz gives *N excelsa*, Bl., as a large evergreen tree of Pegu

1. N. rotundifolia, Roxb Fl Ind i 516, Kurz ii 67 Vern *Bingah*, Burm

Wood yellowish brown, moderately hard, close and even-grained Pores small and moderate-sized Medullary rays fine, uniform, very closely packed, the transverse diameter of the pores being greater than the interval between two successive rays

Burma and the Andaman Islands
Weight, 47 lbs per cubic foot Wood not used, but likely to be of value

			lbs.
B 2536	Burma (1862)		51
B 2288	Andamans (1866)	.	44

B 2233 (47 lbs) sent from the Andamans in 1866 under the name *Htainbyoo* resembles in structure *N rotundifolia*, except that it has slightly larger pores

5 CINCHONA, Linn.

A genus of about 36 species of trees or shrubs found in a narrow belt along the Andes of South America, between 2 300 and 8 000 feet elevation Several species give

1. C. succirubra, Pavon, Brandis 265; Gamble 47. Red Bark.

Wood yellow, moderately hard Pores small, in radial lines. Medullary rays closely packed, fine and very fine.

Cultivated on the Nilgiris and other hills of South India, at the plantations o Rangbi and Poomong in Sikkim, on the hills east of Toungoo in Burma and in part of the Satpura Range in Central India. This species thrives at a lower elevation than the others, but is comparatively poor in quinine, though rich in cinchonine and cinchonidine. From this species is chiefly derived the "Cinchona Alkaloid," which is now largely manufactured at the Government Plantation of Rangbi.

E 1357. } Rangbi, Darjeeling, 3,700 feet.
E 3157. }

2. C. Calisaya, Weddell; Brandis 266; Gamble 47. Yellow Bark.

Wood reddish-grey, moderately hard, even-grained. Pores small, in short radial lines. Medullary rays fine, closely packed.

Cultivated in Sikkim at moderate elevations.

It yields perhaps the most valuable of the Cinchona barks, rich in alkaloids, among which quinine forms $\frac{1}{3}$ to $\frac{4}{5}$ths.

E 1358. } Rangbi, Darjeeling, 3,700 feet.
E 3158. }

3. C. officinalis, Linn.; Brandis 266; Gamble 47. Loxa or Crown Bark.

Wood yellowish grey, similar in structure to that of *C. Calisaya*.

Cultivated at high elevations on the Nilgiris, in Ceylon and in Sikkim, but not extensively.

Its bark is rich in alkaloids, of which more than one-half is quinine.

E 1356. } Rangbi, Darjeeling, 3,700 feet.
E 3159. }

6. HYMENODICTYON, Wall.

Contains about 4 species. *H. flaccidum*, Wall.; Brandis 268; Gamble 47, is a tree of the hills of Eastern Bengal and the outer Himalaya as far west as the Jumna. *H. obovatum*, Wall.; Beddome t. 219; Brandis 268. Vern. *Yella malla kai*, Tam.; *Mallay tanák*, Madura; *Karwai*, Bombay, is a large tree of the Western Ghâts.

1. H. excelsum, Wall.; Beddome cxxx.; Brandis 267. *Cinchona excelsa*, Roxb. Fl. Ind. i. 529. Vern. *Bartu, barthoa*, Pb.; *Bhaulan, bhalena, bhamína, dhauli, kúkúrkat, bhúrkúr, phaldu, bhohár, potúr*, Hind.; *Dondru, dandelo*, Panch Mehals; *Bhoursál*, Mar.; *Sagapu*, Tam.; *Dudiyetta, dudippa, chetippa, burja, bandara*, Tel.; *Bodoka*, Uriya; *Manabina*, Karnúl.

A large deciduous tree. Bark soft, $\frac{1}{2}$ to $\frac{3}{4}$ inch thick, grey, exfoliating in irregularly shaped, softish scales. Wood brownish grey, soft. Annual rings indistinctly marked. Pores moderate-sized, uniformly distributed, often in short radial lines. Medullary rays fine, very numerous, visible on a radial section. Numerous faint, white, transverse bars joining the medullary rays.

Sub-Himalayan tract from the Punjab to Oudh, ascending to 5,500 feet; Central and South India.

Growth moderate, 6 to 7 rings per inch of radius. Average weight of our specimens 31·5 lbs. per cubic foot. Wood used for agricultural implements, scabbards, grain measures, palanquins, toys and similar articles. The inner bark is bitter and

astringent and is used as a febrifuge and for tanning the leaves are used as cattle fodder

		lbs
O 216	Garhwal (1868)	28
O 350	Gorakhpur (1868)	
O 1402	Bharaich Oudh	32
O 1482	Kheri Oudh	34
C 1127	Alari Reserve Central Provinces	32

2 H thyrsiflorum, Wall , Kurz ii 72, Gamble 47 *Cinchona thyrsiflora*, Roxb Fl Ind i 530 Vern *Purgur*, Hind , *Khoo an*, Burm

A deciduous tree Bark 1 inch thick, grey, with corky flakes Wood white or grey, soft Annual rings indistinctly marked Structure the same as that of *H excelsum*

Northern and Eastern Bengal and Burma

Growth moderate 10 rings per inch of radius Weight according to Brandis Burma List of 1862 No 104 28 lbs our specimens give an average of 33 lbs Used for black boards and packing-cases

		lbs
F 1231	Sibsagar Assam	26
E 1286	Cachar	34
B 279	Burma (1867)	31
B 3070	(1862)	38
B 659	Prome Burma	33
B 2287	Andaman Islands	34

7 WENDLANDIA, Bartling

Contains about 12 Indian species *W tinctoria* DC Beddome cxxx Brandis 269 Kurz ii 74 (*Rondeletia tinctoria* Roxb Fl Ind i 521 *Wendlandia* sp Gamble 48) Vern *Tula lodh* Bengal *Kangi* Nep *Singnol* Lepcha *Telli* Uriya *Thitmayoke* Burm is a small tree of the forests of Kumaun Oudh Behar Bengal and Burma whose bark is used in Bengal as a mordant in dyeing Several other species are found in the North East Himalaya and several in Burma chiefly Tenasserim but they are unimportant One or two are climbers

1 W exserta, DC , Beddome cxxx , Brandis 268, Gamble 48 *W cinerea*, DC , Gamble 47 *Rondeletia exserta*, Roxb Fl Ind i 523 Vern *Chaulai*, *chila*, *chilkiya*, *tilla*, *birsa*, *tilki*, *tilsi*, Hind , *Kangi*, *tilki*, *rumri*, Nep , *Kursi*, Seoni , *Marria*, Gondi , *Tilliah*, Baigas in Mandla

A small deciduous tree with brown bark Wood reddish brown, hard, close grained Pores small, medullary rays moderately broad and fine, the former short Annual rings marked by firmer wood on the outer and more porous wood on the inner edge of each ring

Sub-Himalayan tract from the Chenab eastwards Oudh Bengal Central and Southern India

Growth fast 4 5 rings per inch of radius Weight 47 lbs Wood used for building and agricultural implements and used for house posts in the Sikkim Terai

		lbs
O 1170	[illegible] Oudh	47
[illegible]	[illegible] Forest Darjeeling Terai	—

2 W. Notoniana, Wall , Beddome t 224, Thwaites Enum 159 Vern *Rawenelelle*, Cingh

A small tree of South India and Ceylon, with a red wood, having a similar structure to that of *W. exserta*.

		lbs.
No. 74.	Ceylon Collection (marked *W. bicuspidata*)	48

8. WEBERA, Schreb.

Contains about 10 species of small trees, shrubs or climbers from Eastern Bengal, South India and Burma.

W. oppositifolia, Roxb. Fl. Ind. i. 698; Kurz ii. 47 is a small tree of Chittagong and Burma, said by Kurz to have a yellowish white, heavy, close-grained wood. *W. glomeriflora*, Kurz ii. 47, is a small tree of the Pegu Yomas. *W. myrtifolia*, Kurz ii. 49, is a small tree of the swamp forests of Burma and *W. monosperma*, W. and A.; Beddome cxxxiv., is a shrub of the Nilgiri Hills and Wynaad. Kurz also describes 4 scandent shrubs from Chittagong and Burma. Roxburgh gives *W. scandens*, Roxb. Fl. Ind. i. 698. Vern. *Gajer kota*, Beng., as a climber; and *W. odorata*, Roxb. Fl. Ind. i. 699. Vern. *Patagrúja*, Beng., as a small tree, of the forests of Sylhet.

1. W. asiatica, Linn.; Beddome cxxxiii. *W. corymbosa*, Willd.; Roxb. Fl. Ind. i. 697. *Stylocoryne Webera*, A. Rich.; Thwaites Enum. 158. Vern. *Kankra*, Beng.; *Kachuria chál*, Cuttack; *Komi*, Tel.; *Tarana*, Cingh.

A large shrub or small tree. Wood yellowish white, hard, close-grained. Pores small, very numerous, uniformly distributed. Medullary rays short, fine and extremely fine.

Bengal, South India and Ceylon.

Weight, 57 lbs. per cubic foot. The wood is said by A. Mendis to be used in Ceylon for fishing-boats.

		lbs.
No. 84.	Ceylon Collection	57

9. RANDIA, Linn.

Contains 10 to 12 species of shrubs or small trees, generally armed with strong axillary thorns. *R. rigida*, DC.; Brandis 273; Gamble 48, is a shrub found in the forests of the Eastern Himalaya, Nepal and probably Kumaun. *R. fragrans*, Beddome cxxxii. (*Posoqueria fragrans*, Kön.; Roxb. Fl. Ind. i. 717). Vern. *Pedalli*, Tel., is a shrub of South India, used to make hedges. *R. Gardneri*, Thw.; Beddome cxxxii., is a small tree of the South Tinnevelly hills and Ceylon; *R. dekkanensis*, Beddome cxxxiii., is a small tree of the Anamalais; and *R. speciosa*, Beddome cxxxii., a climbing shrub of the Western Gháts, with sweet-scented flowers. *R. nutans*, DC.; Kurz ii., 45 is a shrub of the forests of Pegu.

Wood smooth, close-grained, hard. Pores small or very small. Medullary rays fine and very fine.

1. R. uliginosa, DC.; Beddome cxxxii.; Brandis 273; Kurz ii. 44; Gamble 48. *Posoqueria uliginosa*, Roxb. Fl. Ind. i. 712. Vern. *Pindálu, pindar, panár, paniah, bharani, katúl*, Hind.; *Piralo*, Beng.; *Maidal*, Nep.; *Kaurio*, Panch Mehals; *Pendra*, Uriya; *Katil, pender*, Gondi; *Gangru, gangáru*, Kurku; *Nallaika, nalla kakisha*, Tel.; *Wagatta*, Tam.; *Karé, pendri*, Kan.; *Telphetru, panelra, phetra, pindra*, Mar.; *Tapkél*, Bhíl; *Mhaniben, mhanpyoo*, Burm.

A small deciduous tree. Bark $\frac{1}{8}$ inch thick, reddish brown, exfoliating in thin flakes. Wood whitish grey, close-grained, hard, no heartwood. Annual rings marked by a narrow belt without pores. Pores

small and very small, numerous, uniformly distributed Medullary rays fine and very fine, very numerous, distinctly visible on a radial section

Sub Himalayan tract from the Jumna eastwards, Oudh, Bengal, Burma, Central and South India.

Growth moderate 6 to 7 rings per inch of radius Weight, the average of our specimens gives 48 lbs per cubic foot, Brandis says 41 lbs The fruit is eaten

		lbs
O 512	Dehra Dun	48
O 1158	Bal raich Oudh	47
O 1187	Kheri Oudh	51
C 2782	Melghát Berar	.
C 1186	Ahiri Reserve Central Provinces	
C 2756	Moharli Reserve, Central Provinces	49
W 992	North Kanara	46

2. **R. dumetorum,** Lam , Beddome cxxxii , Brandis 273 , Gamble 48 *Posoqueria dumetorum*, Willd , Roxb Fl Ind i 713 Vern *Mindla, mandkolla, arara*, Pb., *Mainphal, manyul, karhar, main, mainhári, manneul, arar*, Hind , *Maidal, amuki*, Nep , *Gundrow*, Mechi; *Guról*, Rajbanshi , *Panji*, Lepcha , *Patua*, Uriya , *Madu karray*, Tam , *Manda*, Tel , *Gera, galay*, Mar , *Kuay, katúl*, Gondi , *Bhita*, Kurku , *Karé*, Kan

A deciduous thorny shrub or small tree, with grey bark Wood white or light brown, compact, hard Structure the same as that of *R uliginosa.*

Throughout India, extending in the North West Outer Himalaya as far as the Beas

Growth moderate 7 rings per inch of radius according to our specimens, Brandis says slow that "a section of a tree known to be 65 years old 4-inch radius hollow inside shewed 51 annual rings on 2 inches of the radius near the circumference Weight 55 lbs per cubic foot Wood used for agricultural implements fences and fuel The bark of the root and stem and the fruit are used in native medicine the latter as an emetic The fruit is also used to poison fish, and when ripe is roasted and eaten

		lbs
O 262	Garhwal (1868)	54
O 1306	Gonda Oudh	50
O 1161	Bahraich Oudh	62
O 1188	Kheri Oudh	61
C 2759	Moharli Reserve Central Provinces (young)	45
C 2709	Melghát, Berar (young)	48
F 481, E 403	Khookloong forest, Darjeeling Terai	...
F 2180	Bamunpokri, Darjeeling Terai	.

3. **R. tetrasperma,** Bth and Hook f , Brandis 272 *Gardenia tetrasperma*, Roxb Fl Ind. i 709 Vern *Bara garri, katya ginjaru*, Kumaun

[illegible] , very hard [illegible] Medullary [illegible]

Himalaya, from the Indus to Bhutan, ascending to 6 000 feet

Weight, 56 lbs per cubic foot

		lbs
H 157	Simla 6 000 feet	[illegible]
H 2821	„ 5 000 „	..

10. GARDENIA, Linn.

Contains 12 to 15 Indian species of shrubs or trees. *G. gummifera,* Linn.; Roxb. Fl. Ind. i. 708; Beddome cxxxiv. 1; Brandis 270. Vern. *Dekámáli, kamarri,* Hind.; *Chitta matta, chitnityal, gaggaru,* Tel.; *Chitta, bikke, kambi,* Kan., is a large shrub of Central and South India, with a white hard wood, and giving a yellow gum resin. *G. montana,* Roxb. Fl. Ind. i. 709. Vern. *Teliga, tella kakisha,* Tel., is a small tree of South India. *G. coronaria,* Ham.; Kurz ii. 43, is a tree of Chittagong and Burma, with a heavy, close-grained wood. *G. sessiliflora,* Wall.; Kurz ii. 40. Vern. *Majeebouk,* Burm., is a tree of the hills of Burma. Kurz describes several other Chittagong and Burma species of less importance. *G. florida,* Linn., of Indian gardens, is an introduction from China.

Wood smooth, close-grained, hard. Pores small to extremely small, numerous, uniformly distributed. Medullary rays very fine to moderately broad.

1. G. turgida, Roxb. Fl. Ind. i. 711; Beddome cxxxiv. 1.; Brandis 270; Kurz ii. 41. Vern. *Thanella, khúrrúr, khuriari, ghúrga, mhaner,* Hind.; *Karhár,* Banda; *Panjra, pendra,* Gondi; *Phurpata,* Kurku; *Khurphendra, pendri, phanda, phetra,* Mar.; *Phetrak,* Bhíl; *Bamemia,* Uriya; *Manjúnda, telél,* Tel.; *Bongeri,* Kan.; *Thamengsanee,* Burm.

A small deciduous tree. Bark smooth, bluish grey, $\frac{1}{5}$ inch thick, compact. Wood close-grained, hard, white with a purplish tinge, no heartwood. Annual rings indistinct. Pores very small. Medullary rays fine and very fine, very numerous.

Sub-Himalayan tract from Nepal to the Jumna, ascending to 4,000 feet; Rajputana, Burma, Central and South India.

Growth slow, 13 rings per inch of radius. Weight, according to R. Thompson 56·5 lbs. per cubic foot; our specimens give 54 lbs. Wood good, but splits and cracks in seasoning.

			lbs.
O	541.	Dehra Dún	...
O	1377.	Gonda, Oudh	60
O	1463.	Bahraich, Oudh	...
O	1489.	Kheri, Oudh	50
C	826.	Bairagarh Reserve, Berar	54
C	2779.	Melghát, Berar	58
C	1142.	Ahiri Reserve, Central Provinces	54
W	993.	North Kanara	48

Nos. C 1248 and C 1309 (61 and 63 lbs.) sent from Gumsúr under the name *Gorahadu,* have the same structure as, and probably are, this species.

2. G. lucida, Roxb. Fl. Ind. i. 707; Beddome cxxxiv.; Brandis 271. *G. resinifera,* Roth.; Kurz ii. 42. Vern. *Dikamali,* Hind., Guz.; *Konda manga, kokkita, tetta manga,* C.P.; *Papar,* Bijeragogarh; *Karinga, karaingi, tella-manga,* Tel.; *Kumbi,* Tam.

A small deciduous tree. Bark $\frac{1}{3}$ inch thick, greenish grey, exfoliating in irregular flakes. Wood yellowish white, close-grained, hard, no heartwood, no annual rings. Pores extremely small. Medullary rays very fine.

Central and South India, Chittagong.

Weight, 39 lbs. per cubic foot. Wood useful for turning; it is made into combs. It gives a gum resin from wounds in the bark. This gum is hard, opaque, yellow, greenish or brown, with a strong smell, and is used in the treatment of cutaneous diseases and to keep off flies and worms.

			lbs.
C	1185.	Ahiri Reserve, Central Provinces	39

3 G latifolia, Aiton, Roxb Fl Ind i 706 (? *cf* Brandis 272), Beddome cxxxiv 1, Brandis 271 Vern *Papra, páphar, pepero, ban pindálu,* Hind, *Pannia bhil, gúngat, bhandara, geggar,* Gondi, *Phip-har, mali,* Bhugris, *Kumbay,* Tam, *Pedda karinga, pureea, bikki, gaiger,* Tel, *Kota-ranga,* Uriya, *Ghogar, gogarli,* Mar, *Gogar,* Bhil

A small deciduous tree. Bark ½ inch thick, greenish grey, exfoliating and leaving smooth, conchoidal, rounded depressions Wood light-yellowish brown, close and even grained, hard, handsomely mottled, neither warps nor splits No heartwood Marked concentric annual rings Pores extremely small, numerous Medullary rays fine, short

Sub Himalayan tract from the Jumna eastwards Bengal, Central and South India

cubic foot

bstitute for

are made

of it

		lbs
B 1173	Ahiri Reserve Central Provinces	53
B 2733	Moharli Reserve, Central Provinces	50

4. G. obtusifolia, Roxb., Kurz ii 42 Vern. *Yengkhat,* Burm

A small deciduous tree with thin, grey bark Wood white, moderately hard, even-grained Pores small Medullary rays moderately broad, and a large number of very fine rays, which are not very distinct

Burma

Weight 55 lbs per cubic foot It yields a yellow pellucid resin

		lbs
B 817	Rangoon Division, Burma	55

5 G. costata, Roxb Fl Ind i 704 *G coronaria,* Ham, Kurz ii 43 Vern *Yengkhat, tsaythambyah*

A ... ood light brown, hard, ... mall Medullary rays ... long horizontal plates

Chittagong and Burma ... os per cubic foot (Kurz ... with this Weight 49 lbs)

		lbs
B 284	Burma (1867)	50
B 2540	" (1862)	52

11 GUETTARDA, Linn

1 G speciosa, Linn, Roxb Fl Ind i 686, Beddome cxxxiv 4, Kurz ii 37 Vern *Domdomah,* And, *Nil piteha,* Cingh

A moderate-sized evergreen tree with thin grey bark Wood yellow, with a tinge of red Pores small, often in radial lines Medullary rays, moderately broad and very fine

Tidal forests along the shores of the Andaman Islands and Ceylon

		lbs
B 1971	Andaman Islands (Kurz 1866)	49

12. PLECTRONIA, Linn.

Contains 10 to 12 shrubs, part of which are found in South India and Ceylon, and part in Burma and the Andamans. *P. parviflora*, Roxb.; Beddome cxxxiv. 5; (*Canthium parviflorum*, Roxb. Fl. Ind. i. 534) Vern. *Balsu*, Tel., is a thorny shrub of South India, whose wood is hard and used for turning, and whose leaves are eaten in curries.

1. P. didyma, Bth. and Hook. f.; Kurz ii. 35. *Canthium didymum*, Gaertn.; Roxb. Fl. Ind. i. 535; Beddome t. 221; Brandis 276. Vern. *Tolan*, Uriya; *Neckanie, nalla balsu*, Tam., Tel.; *Abalu*, Kan.; *Arsúl*, Bombay; *Poruwa*, Cingh.

A large shrub. Wood grey, hard. Pores very small, numerous, uniformly distributed. Medullary rays fine and very fine, numerous.

South India, Ceylon and Tenasserim.
Weight, 57 lbs. per cubic foot. Wood used for agricultural purposes.

		lbs.
No. 16.	Salem Collection	57

13. IXORA, Linn.

A large genus containing some 30 or more Indian and Burmese shrubs or small trees. Beddome describes 7 species from South India, and Kurz 24 (excluding *Pavetta*) from Burma, while many species come from Eastern Bengal and Assam. *I. coccinea*, Linn.; Roxb. Fl. Ind. i. 375; Beddome cxxxiv. 7; Kurz ii. 26 (*I. Bandhuca*, Roxb. Fl. Ind. ii. 376). Vern. *Rangun, rajana*, Beng.; *Bandhuka*, Sans., is a well-known scarlet-flowered shrub called the "Flame of the Woods," indigenous in South India, Chittagong and Burma and cultivated in gardens all over India. *I. stricta*, Roxb. Fl. Ind. i. 379; Kurz ii. 26, is another scarlet-flowered species from Tenasserim. *I. acuminata*, Roxb. Fl. Ind. i. 383; Gamble 48. Vern. *Churipat*, Nep., is a handsome shrub of Sikkim, Assam and Eastern Bengal with large, crowded corymbs of scented white flowers. *I. undulata*, Roxb. Fl. Ind. i. 385; Gamble 48. Vern. *Palukajui*, Beng.; *Pari*, Nep.; *Takchirnyok*, Lepcha, is a small tree of Bengal, and *I. villosa*, Roxb. Fl. Ind. i. 383. Vern. *Chunari*, Beng., of Sylhet. *I. barbata*, Roxb., and *I. polyantha*, Wight; Beddome cxxxiv. 7, are small trees of the Western Ghâts.

1. I. parviflora, Vahl.; Roxb. Fl. Ind. i. 383; Beddome t. 222; Brandis 275; Kurz ii. 21. The Torch Tree. Vern. *Kota gandhal*, Hind.; *Rangan*, Beng.; *Disti*, Gondi; *Kúrat, lokandi*, Mar.; *Shulundu kora*, Tam.; *Karipal, kachipadél, tadda pallu*, Tel.; *Kori*, Gondi; *Korgi*, Kan.; *Tellu kurwan*, Uriya; *Maha ratambala*, Cingh.

An evergreen shrub or small tree. Bark ¼ inch thick, dark brown, exfoliating in irregular rounded scales. Wood light brown, smooth, very hard, close-grained. No heartwood. Annual rings indistinct. Pores very small. Medullary rays very fine and very numerous.

Bengal, Burma, Central and South India.
Growth moderate, 10 rings per inch of radius. Weight according to Skinner, No. 84 66 lbs.; our specimen gives 57 lbs. Skinner gives P = 717. The wood is well suited for turning and might do for engraving. Beddome says it is used for furniture and building purposes. The green branches are used for torches.

		lbs.
C 1156.	Ahiri Reserve, Central Provinces	57

14. PAVETTA, Linn.

Contains 6 to 8 species of Indian shrubs or small trees. *P. indica*, Linn.; Beddome cxxxiv. 7; Brandis 275 (*Ixora Pavetta*, Roxb. Fl. Ind. i. 385; Kurz ii. 18.) Vern.

Kukúra chúra, Beng., *Pavetti*, Tam ; *Nuni paputa, tapra*, Tel , *Pawetta*, Cingh , ... parts of Central India ... xxxiv 7, is a shrub of the ... 4 other species, viz *I* ... ; *I weberæfolia*, from the ... 681), from Chittagong

1. P. tomentosa, Smith ; Beddome cxxxiv. 7 , Brandis 275. *Ixora tomentosa*, Roxb. Fl. Ind i 386 , Kurz ii 19 ; Gamble 48 Vern *Padera*, Kumaun ; *Júi*, Beng. ; *Sundók*, Lepcha, *Papiri, papatta, nam-papúta*, Tel

A large shrub with thin, smooth, brownish grey bark. Wood light brown, hard, close grained. Pores extremely small. Medullary rays short, numerous, fine and very fine.

Sub-Himalayan tract from the Ganges eastwards, ascending to 4 000 feet, Bengal, South India and Burma

		lbs
O 3086	Gonda, Oudh	59

15 COFFEA, Linn

... 277, Kurz ii 28, ... found in most ... by Mechis and

1. C. arabica, Linn , Roxb Fl Ind i 539 , Beddome cxxxiv. 8 , Brandis 276 , Kurz ii 27 , Gamble 49 Vern *Bun* (the berry), *Kahwa* (the same roasted and ground)

A shrub with thin grey bark Wood white, moderately hard, close-grained Pores very fine and extremely fine. Medullary rays very fine, numerous

Indigenous in Abyssinia and Soudan, cultivated since the fifteenth century in Arabia and introduced thence to India It has been cultivated in many pasts of India, but on a large scale only in Mysore, Coorg, the Western Ghats and Ceylon It is occasionally found running wild in the forests Growth moderate

P 3150 Coorg (20 25 years old)

Prismatomeris tetrandra, Hook f and Bth Genera Pl ii 119 (*Coffea tetrandra*, Roxb , Kurz ii 28) is an evergreen tree of the forests of Chittagong, the Martaban Hills and Andaman Islands up to 3,000 feet elevation.

16 MORINDA, Linn

... evergreen scandent shrub of ... ... 5 other species from Burma

1. M. exserta, Roxb. Fl. Ind. i. 545; Beddome cxxxiv.; Brandis 277; Kurz ii. 59. Vern. *Al, ach,* Hind.; *Alleri, alládi,* Panch Mehals; *Hardi,* Nep.; *Noona,* Tam.; *Toghur, togara mogali, mogali, manja pavatti,* Tel.; *Achu,* Uriya; *Nyau,* Burm.; *Ali,* Gondi.

A moderate-sized deciduous tree. Bark corky, brittle, brown or grey, with numerous deep, longitudinal cracks. Wood red, often yellow, with red streaks, or brown, moderately hard, close-grained. Annual rings faintly marked. Pores small, scanty, generally in radial lines between the numerous, fine and moderately broad medullary rays.

Bengal, Burma, Guzerat, South India.

Growth moderate, 7 rings per inch of radius. Weight, according to Skinner, No. 97 (*M. citrifolia*) 30 lbs. per cubic foot; Wallich 29 lbs.; our specimens give 41 lbs. Skinner gives P = 410. The wood is durable: Wallich's specimen (No. B 2690), cut in Burma in 1828, was quite sound when cut up after 50 years in Calcutta. It is used for plates and dishes. The bark of the root is largely used for dyeing red and yellow.

		lbs.
C 1130.	Ahiri Reserve, Central Provinces	36
C 1307.	Gumsúr, Madras	42
C 1246.	„ „	47
B 2690.	Tavoy (Wallich 1828)	41
No. 34.	Salem Collection	40

17. LEPTODERMIS, Wall.

1. L. lanceolata, Wall.; Brandis 279. Vern. *Jogia padera,* Kumaun.

A small shrub of the North-Western Himalaya, generally on rocks between 5,000 and 10,000 feet. Bark thin, grey. Wood hard, white. Pores very small, scanty. Medullary rays fine and moderately broad.

		lbs.
H 2822.	Simla, 6,000 feet	48

ORDER LVII. COMPOSITÆ.

The largest Order of plants not only in India, but in the world. With very few exceptions, all the species are herbaceous. There are, however, genera containing shrubs or small trees. They belong to the following Tribes:—

Tribe I.—Vernonieæ	*Vernonia.*
„ II.—Asteroideæ	*Microglossa.*
„ III.—Inuloideæ	*Blumea, Pluchea* and *Inula.*
„ IV.—Anthemideæ	*Artemisia.*
„ V.—Mutisiaceæ	*Leucomeris.*

Microglossa volubilis. DC.; Kurz ii. 82, is a large climber of the hills of Martaban and Tenasserim, found in second-growth forests. *Blumea balsamifera,* DC.; Kurz ii. 82 (*Conyza balsamifera,* Roxb. Fl. Ind. iii. 427; Gamble 50) Vern. *Poungma-theing,* Burm., is a shrub which comes up freely on old cultivated lands in Northern and Eastern Bengal and Burma. *Pluchea indica,* Less.; Kurz ii. 83. Vern. *Kayu,* Burm., is a large evergreen shrub of tidal forests on the coasts of Chittagong, Burma and the Andamans. *Inula eupatorioides,* DC., and *Inula Cappa,* DC., are small shrubs of the Himalaya. *Leucomeris* contains two species: *L. spectabilis,* Don. Vern. *Panwa,* Kumaun; *Bhoea, phusrae,* Nep., a small tree of Nepal, also found in Garhwal; and *L. decora,* Kurz ii. 78, a deciduous tree of the Eng forests of Prome

1 VERNONIA, Schreb

About 7 species of small trees or climbers *V Wightiana* Bth and Hook f (*Monosis Wightiana* Beddome t 226) is a tree of the Nilgiri Hills *V Kurzii*, C B Clarke, Kurz ii 80 is a small tree of the toungyas in the Martaban Hills and V *arborea* Ham is found in Tenasserim The other three species are Burmese climbers

1. V. volkameriæfolia, DC, Beddome t 225, Gamble 50 *V acuminata*, DC, Kurz ii 79

A small tree Bark brown Wood whitish, turning pale brown, moderately hard Pores moderate-sized, often in short radial lines Medullary rays numerous, fine and moderately broad Pith large

Eastern Himalaya South India and Burma

Weight 31 5 lbs This is probably Kyd's *Vernonia (major)*—Weight 31 5 lbs P = 383

E 3312 Pankabari Darjeeling 3 000 feet

2 ARTEMISIA, Linn

Contains the ' Wormwoods only one of which reaches the size of a small shrub The leaves of many species are used as a febrifuge and in the preparation of "absinthe

1. A. vulgaris, Linn, Roxb Fl Ind iii 420, Gamble 50 Vern *Naga, naga dona, dona*, Hind, Beng, *Titapat*, Nep

Bark thin, with longitudinal fissures Wood grey, hard Pores very small, in short radial lines between the distant, fine and moderately broad medullary rays

A gregarious shrub coming up on old cultivations between 3 000 and 6 000 feet in the Sikkim Hills and often covering large tracts of land until killed down by the tree growth which succeeds it This is probably the *Nagdana* of Cachar said by Mr Brownlow to be one of the plants on which the *Attacus Atlas* silkworm is fed Its ashes when burnt are considered to give a good manure for cultivation

E 2857 Tukdah Forest Darjeeling 5 000 feet

ORDER LVIII GOODENOVIEÆ

Scævola Koenigii Vahl Kurz ii 84 (*S Taccada*, Roxb Fl Ind i 527) Vern [illegible] but in this Order by [illegible] evergreen large shrub, [illegible] It has a soft, spongy [illegible]

ORDER LIX VACCINIACEÆ

An Order of small trees or shrubs [illegible] the mountains [illegible] and Southern India It contains 4 genera [illegible], *Pentapterygium* [illegible] and *Corallobotrys* *Agapetes* contains [illegible] species, mostly [illegible] *variegata* G Don (*Thibaudia variegata* [illegible] 79 *Ceratostema* [illegible] Roxb Fl Ind ii 413, *Vaccinium* [illegible] 83) Vern [illegible]

1. M. exserta, Roxb. Fl. Ind. i. 545; Beddome cxxxiv.; Brandis 277; Kurz ii. 59. Vern. *Al, ach,* Hind.; *Alleri, alládi,* Panch Mehals; *Hardi,* Nep.; *Noona,* Tam.; *Toghur, togara mogali, mogali, manja pavatti,* Tel.; *Achu,* Uriya; *Nyau,* Burm.; *Ali,* Gondi.

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C 1130.	Ahiri Reserve, Central Provinces	36
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A small tree Bark brown Wood whitish, turning pale brown, moderately hard Pores moderate-sized, often in short radial lines Medullary rays numerous, fine and moderately broad Pith large

Eastern Himalaya, South India and Burma

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E 2857 Tukdah Forest Darjeeling 5 000 feet

ORDER LVIII GOODENOVIEÆ.

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ORDER LIX VACCINIACEÆ.

An Order of small trees or shrubs, [illegible] the mountains [illegible] and Southern India It contains 4 genera *Agapetes*, *Pentapterygium* [illegible] and *Corallobotrys* *Agapetes* contains about 15 species, [illegible] *variegata* G Don (*Thibaudia* [illegible] Wall, [illegible] Roxb Fl Ind ii 413, *Vaccinium* [illegible], Kurz [illegible]

is a shrub, often epiphytic, of the Khasia and Gáro Hills, Sylhet, Chittagong and Tenasserim. *A. obovata*, Don (*Vaccinium obovatum*, Wight; Gamble 50) Vern. *Ratay*, Nep., is a common shrub of the hill forests of Sikkim and Bhutan. *A. saligna*, Bth. and Hook. f.; Gamble 50, is a large epiphytic shrub of the Sikkim Hills from 1,000 to 5,000 feet, whose leaves are said by Hooker to be used as a substitute for tea. *A. Wallichiana*, Wight, and *A. hirsuta*, Wight, are shrubs of Sylhet; *A. verticillata*, Wight, and *A. odontocera*, Wight, of the Khasia Hills and Burma; and *A. auriculata*, Griff., is an epiphytic shrub of Burma.

Pentapterygium contains 3 species, among which *P. serpens*, Bth.; Gamble 50. Vern. *Kali hurchu*, Nep.; *Kúmbuten*, Lepcha, is a handsome epiphytic shrub common on trees and banks about Darjeeling.

Corallobotrys acuminata, Hook. f. and Bth. (*Vaccinium acuminatum*, Kurz ii. 90), is an evergreen shrub of Eastern Bengal and Burma.

1. VACCINIUM, Linn.

About 12 species, of which 4 occur on the Nilgiris and the rest in Eastern Bengal and Burma. *V. Leschenaultii*, Wight; Beddome t. 227. Vern. *Andúvan*, Nilgiris, is a pretty tree with an edible fruit, said by Beddome to have a fine-grained rose-coloured wood. *V. rotundifolium*, Wight, and *V. neilgherrense*, Wight; Beddome cxxxvi., are also small trees of the hills of South India. *V. Donianum*, Wight; Kurz ii. 91, is a large shrub of Burma and the Khasia Hills. *V. Dunalianum*, Wight, is an epiphytic shrub of Sikkim, Bhutan and the Khasia Hills.

1. V. serratum, Wight; Gamble 50. Vern. *Charu*, Nep.

A shrub, often epiphytic. Bark brown with white lenticels. Wood white. Pores extremely small. Medullary rays broad, wavy.

Sikkim, Bhutan and the Khasia Hills, from 4,000 to 8,000 feet.

E 3296. Babookhola, Darjeeling, 4,000 feet.

ORDER LX. ERICACEÆ.

Contains about 6 Genera of usually handsome-flowered Indian trees or shrubs; some of these, however, especially the genera *Cassiope* and *Diplarche*, contain merely small prostrate heath-like plants, found in the Inner Himalaya. The Genera belong to 2 Tribes, *viz.*:—

Tribe I.—Andromedeæ	*Gaultheria*, *Cassiope*, *Pieris* and *Enkianthus*.
„ II.—Rhodoreæ	*Diplarche* and *Rhododendron*.

Gaultheria contains about 5 species. *G. fragrantissima*, Wall.; Beddome cxxxvi. Vern. *Kappúrú*, Cingh., is a common shrub of the Nilgiri and Pulney Hills and Ceylon. *G. punctata*, Bl.; Kurz ii. 92 (in this he includes *G. fragrantissima*) is an evergreen shrub of the hill forests of Martaban at 6,000 to 7,000 feet; and *G. Griffithiana*, Wight; Gamble 51, is a small shrub of the hills of Sikkim and Bhutan from 7,000 to 9,000 feet. *Cassiope fastigiata*, Don, Vern. *Chhota lewar*, Beas; *Seeru*, Chor; *Kamba*, Kumaun, is the "Himalayan Heather" of travellers in the North-West Himalaya; it often covers large areas like the European heather. It was also found by Hooker in Sikkim at Mon Lepcha. The common "Heather" or "Ling" of Europe is *Calluna vulgaris*, Linn.

Bark generally thin. Wood compact, even-grained. Pores uniform and uniformly distributed, small or very small, numerous. Annual rings generally marked by belt of porous wood. Medullary rays short, generally fine or very fine.

1 PIERIS, Don.

P lanceolata Don is a small tree of the Khasia Hills and *P formosa* Don (*Andromeda formosa* Wall Brandis 280 Vern *Sheaboge*, Nep) an evergreen tree of the Himalaya from Kumaun to Bhutan

1 P ovalifolia, Don *Andromeda ovalifolia*, Wall, Brandis 280, Kurz ii 92, Gamble 50 Vern *Ayatta, eilan, ellal, arur, aiwan, aira, rattankat, erana, yarta*, Pb, *Ayar*, Hind, *Anjir, angiar, aigiri, jagguchal*, Nep, *Piazay*, Bhutia, *Kangshior*, Lepcha

A small deciduous tree Bark brown, peeling off in long narrow strips, deeply cleft, the clefts often extending spirally round the stem Wood light reddish brown, moderately hard Annual rings marked by numerous larger pores in the spring wood Pores small in the spring wood, very small in the autumn wood Medullary rays fine, short, marked on a radial section as long narrow bands

... nd 8 000 feet

... 18 rings per ... lbs per cubic ... only used for fuel and charcoal The young leaves and buds are poisonous to goats they are used to kill insects and an infusion of them is applied in cutaneous diseases The bark of the Darjeeling tree is not so characteristically thick as that of the North West tree

			lbs
H	17	Simla 7 000 feet	41
E	3328	Darjeeling 6 500 feet	

2 ENKIANTHUS, Lour

1. E himalaicus, Hook f and Th, Gamble 50 Vern *Chothu*, Nep

A small tree with thin grey bark Wood white, moderately hard, even grained Annual rings marked by a belt of more numerous pores Pores very small and extremely small Medullary rays moderately broad and fine Numerous, wavy, fine, concentric bands of soft tissue

Sikkim Himalaya 10 000 to 12 000 feet
Growth slow 40 rings per inch of radius

E 976 Chumbi Valley Tibet about 10 000 feet

3 RHODODENDRON, Linn

... of great ... rth West ... ces are ... largest ...

with white or pale yellow flowers: *R. setosum*, Don. Vern. *Tsalu*; Bhutia, a red-flowered shrub of Sikkim which, with the last, gives a very strong and somewhat unpleasant aromatic scent: and *R. lepidotum*, Wall.; Brandis 282; Gamble 52. Vern. *Tsaluma, tsuma*, Bhutia, with reddish flowers. *R. formosum*, Wall.; Kurz ii. 94, is a small shrub of the Khasia and Nattoung Hills, above 7,000 feet. *R. moulmeinense*, Hook.; Kurz ii. 94, an evergreen tree of the hills of Martaban and Tenasserim above 4,000 feet. *R. Hodgsoni*, Hook. f.; Gamble 5, is a small tree of Sikkim from the wood of which the Tibetan yak saddles are frequently made, and whose leaves are used for plates and lining baskets. *R. nivale*, Hook. f., found at 17,500 to 18,000 feet altitude in the Sikkim Himalaya, is a small shrub which probably attains the highest elevation of any known woody plant.

The Indian rhododendrons are all characterised by even-grained wood, soft or moderately hard; by very fine and extremely fine pores, more numerous in the spring wood; and by fine, generally short medullary rays. The wood is apt to warp, with the exception of that of *R. argenteum* and *R. Falconeri*.

1. R. arboreum, Sm.; Beddome t. 228; Brandis 281; Kurz ii. 93; Gamble 51. *R. puniceum*, Roxb. Fl. Ind. ii. 409. Vern. *Chhán*, Hazara; *Ardáwal*, Jhelum; *Mandál*, Chenab; *Chiu, áru*, Ravi; *Brás, bras, búrans, búrúnsh*, Beas to the Sarda River; *Brus*, Kumaun; *Bhoráns, gurás, ghonás, taggú, lal gurás*, Nep.; *Etok*, Bhutia, Lepcha; *Billi, poomaram*, Nilgiris; *Ma-ratmal*, Cingh.

A small evergreen tree. Bark 1 inch thick, reddish brown, peeling off in small flakes. Wood soft, reddish white or reddish brown, close and even-grained, apt to warp and shrink. Annual rings marked by a belt of slightly larger pores in the spring wood. Pores very small and extremely small, uniformly distributed. Medullary rays fine and moderately broad, short, visible on a radial section.

Outer Himalaya from the Indus to Bhutan between 3,000 and 11,000 feet, hills of Southern India and Ceylon, Karennee Hills in Burma.

Growth slow: according to Brandis 14 rings per inch of radius; our specimens give 12 rings for the North-West specimens, and 22 to 36 rings for those from Sikkim.

Weight, 41·4 lbs. per cubic foot on an average of 5 specimens, the Sikkim ones weighing 39, while the Simla specimens give 45 lbs. The wood seasons very badly, and is chiefly used for fuel and charcoal, but is also sometimes employed for building and for making dishes, in Sikkim for "kukri" handles, boxes and other small articles, and on the Nilgiris for gun-stocks and posts. The flowers are eaten and are made into preserves; they are commonly offered in temples.

			lbs.
H	3171.	Dungagalli, Hazara, 7,000 feet	...
H	14.	Simla, 7,000 feet	45
H	73.	Mashobra, Simla, 7,000 feet	45
E	371.	Senchul forest, Darjeeling, 7,500 feet	39
E E	383. 2388.	Tonglo, Darjeeling, 10,000 feet	39

The two last are the species *R. Campbelliæ*, Hook. f.; Gamble 51, distinguished from *R. arboreum*, Sm., by the ferruginous tomentum and cordate base of the leaf, but probably only a variety.

2. R. argenteum, Hook. f.; Gamble 51. Vern. *Kali gurás, putlinga*, Nep.; *Etok-amat*, Lepcha.

An evergreen tree. Bark reddish brown, peeling off in small scales. Wood yellowish, with darker heartwood, shining, soft, close and even-grained. Pores very small, somewhat more numerous in the spring wood.

Medullary rays of two sizes, very fine and very numerous between fewer short and moderately broad rays

Hills of Sikkim common on the outer ranges round Darjeeling and Dumsong from 6 000 to 10 000 feet

Growth slow 27 rings per inch of radius Weight 39 lbs per cubic foot The wood warps less than that of *R arboreum* Flowers pure white with a purple throat

		lbs
F 372	Tonglo, Darjeeling 9 000 feet	39

3 **R Falconeri**, Hook f, Gamble 51 Vern *Kurlinga*, Nep, *Kégu*, Bhutia

A moderate sized evergreen tree Bark reddish brown, peeling off in flakes, inner bark purple red Wood reddish white, shining with a beautiful satiny lustre, takes a beautiful polish, hard Annual rings marked by more numerous pores in the spring wood Pores very small and extremely small Medullary rays fine and moderately broad, short

Hills of Sikkim especially the summit of Tonglo at 10 000 feet

Growth slow 17 rings per inch of radius Weight 39 lbs per cubic foot Does not warp Flowers cream coloured

		lbs
E 369	Tonglo Darjeeling 10 000 feet	39

4 **R barbatum**, Wall, Gamble 51 Vern *Guras, chimal*, Nep, *Kému*, Bhutia

A small evergreen tree Wood light pinkish red, shining Annual rings marked by a belt of more numerous and larger pores Pores very small and extremely small Medullary rays fine and very fine, numerous

Eastern Himalaya from 8 000 to 11 000 feet

Growth slow 35 rings per inch of radius Weight 39 lbs per cubic foot Flowers deep crimson

		lbs
E 375	Tonglo Darjeeling 10 000 feet	39

5 **R campanulatum**, Don, Brandis 281 Gamble 52 Vern *Gaggar, yurmi*, Kashmir, *Sarngar, shinwala*, Ravi *Shargar*, Beas, *Simrung*, Sutlej, *Chimul*, Kumaun, *Cherrala, teotosa* Nep

An evergreen shrub with thin grey bark Wood light pinkish red, moderately hard Annual rings distinctly marked by more numerous pores in the spring wood Pores very small and extremely small Medullary rays fine, very short

Inner Himalaya from the Indus to Nepal between 9 500 and 14 000 feet Outer ranges on Chor and Kedarkanta Sikkim at 11 000 feet (C B Clarke)

Growth moderate to slow Our specimens shew 28 rings per inch of radius while Aitin with Wallich's specimens found 8 4 rings per inch very distinctly marked Weight 39 lbs per cubic foot Flowers light pink lilac or mauve

		lbs
H 121	Jalari Pass Seoraj Kulu 10 000 feet	39
H 128	Rotang Pass Kulu 13 000 feet	

6 **R fulgens**, Hook f, Gamble 51 Vern *Chimal*, Nep

A small tree or large shrub Wood grey, darker moderately hard, even grained Annual rings marked

wood at the inner edge. Pores very small. Medullary rays short, fine very numerous.

Sikkim Himalaya, from 12,000 to 14,000 feet.
Growth slow, 25 rings per inch of radius. Weight, 36 lbs. per cubic foot Flowers deep crimson.

	lbs.
E 2957. Sandúkpho, Darjeeling, 12,000 feet	36

7. **R. cinnabarinum,** Hook. f.; Gamble 51. Vern. *Búlú,* Nep. *Kema kechoong,* Lepcha.

A large shrub with thin grey bark. Wood grey, moderately hard even-grained, warps. Annual rings not visible. Pores very small Medullary rays short, fine.

Sikkim Himalaya above 12,000 feet.
Weight, 42 lbs. per cubic foot. The leaves are poisonous and the smoke of the wood causes inflammation of the face and eyes, according to Hooker. Flowers scarlet

	lbs.
E 2958. Sandúkpho, Darjeeling, 12,000 feet	42

ORDER LXI. EPACRIDEÆ.

An Australian Order, of which one species only extends north to Tenasserim, *viz. Leucopogon malayanus,* Jack; Kurz ii. 95, an evergreen, small, rigid shrub.

ORDER LXII. PLUMBAGINEÆ.

An Order containing only one Indian species. *Ægialitis annulata,* R. Br.; Kurz ii. 96 (*Æ. rotundifolia,* Roxb. Fl. Ind. ii. 111), is a small evergreen treelet with a conically thickened trunk, found in the tidal forests of the Sundarbans, Chittagong, Arracan, Burma and the Andaman Islands.

ORDER LXIII. MYRSINEÆ.

Contains 6 Genera of Indian trees, shrubs, or climbers, belonging to the following Tribes:—

Tribe I.—Mæseæ	*Mæsa.*
„ II.—Eumyrsineæ	*Myrsine, Samara, Ardisia* and *Ægiceras.*
„ III.—Theophrasteæ	*Reptonia.*

Wood compact, close-grained. Pores very small or extremely small often in groups and radial or oblique lines. Medullary rays distant broad.

1. MÆSA, Forskal.

Contains 10 to 12 species of shrubs or trees. *M. indica* A. DC.; Beddome cxxxvii.; Brandis 283; Kurz ii. 99; Gamble 52 (*Bæobotrys indica,* Roxb. Fl. Ind. i 557) Vern. *Kalsis,* Kumaun; *Atki,* Bombay; *Bilauni,* Nep.; *Phadupjoh,* Mechi *Ramjani,* Beng.; *Tamomban,* Magh, is a shrub of the Sub-Himalayan tract from the Ganges to Assam, Bengal, South India and Burma. *M. argentea,* Wall.; Brandis

283 Vern *Phusera, gogsa* Hind ... shrub of the outer Himalaya ...

... Burma and the Andaman ... Kurz to have a brown heavy close ... wood

1 M montana, A DC, under *M indica*, A DC in Brandis 283, Gamble 52 Vern *Bilauni*, Nep, *Parmo*, Lepcha

An evergreen, gregarious shrub or small tree Bark thin, reddish brown Wood soft Pores small, scanty, uniformly distributed Medullary rays moderately broad, numerous

North East Himalaya from Nepal eastwards Eastern Bengal and Burma (var *B elongata* = *M paniculata* A DC Kurz ii 99) often forming coppice-like dense second growth forests at elevations from 3 000 to 6 000 feet on the Sikkim and Bhutan Hills

Growth rather fast 6 rings per inch of radius used only for fuel and rough house posts

E 2389 Tukdah Forest Darjeeling 6 000 feet

2 MYRSINE, Linn

Contains 3 to 5 species *M capitellata* Wall Beddome t 234 Brandis 286 (*M avenis* DC Kurz ii 105) is a small tree of Eastern Bengal South India, Ceylon and Burma said by Beddome to have a hard and durable timber Weight 22 lbs (Wallich)

1 M semiserrata, Wall, Brandis 285, Kurz ii 105, Gamble 52 Vern *Parwana, kungkung gogsa bamora, gaunta*, Hind, *Chupra*, Kumaun, *Bilsi, beresi, kalikatha, bilauni*, Nep, *Tungcheong*, Lepcha

A shrub, small or middling sized tree Bark ash-coloured, dark, nearly black with prominent dots Wood red, hard Pores extremely small, in small patches between the distant, broad medullary rays

Outer Himalaya from the Beas to Bhutan from 3 000 to 9 000 feet Nattoung Hills of Martaban

Wallich says the wood is chocolate coloured heavy hard handsome and used in Nepal for carpenters work It splits rather and is usually too small for anything but firewood

		lbs
H 2830	The Glen Simla 6 000 feet	51
E 3322	Darjeeling 6 500 feet	...

2 M africana, Linn, Brandis 286 Vern *Bebrang, kakhum, kokhuri, kanuk gugul, jutru, chachri, pratshu, branchu, khushin, papri, bandaru, birsir, atuljan*, Pb *Guvaini, pahari cha, chupra*, North-Western Provinces

A small, evergreen shrub Wood white moderately hard Pores extremely small, often in short radial lines, between the distant, fine medullary rays

...

... *ng* and often used as a ... might be useful for hedges

		lbs
H 2829	Simla 6 000 feet	49

wood at the inner edge. Pores very small. Medullary rays short, fine, very numerous.

Sikkim Himalaya, from 12,000 to 14,000 feet.
Growth slow, 25 rings per inch of radius. Weight, 36 lbs. per cubic foot. Flowers deep crimson.

		lbs.
E 2957.	Sandúkpho, Darjeeling, 12,000 feet	36

7. R. cinnabarinum, Hook. f.; Gamble 51. Vern. *Búlú*, Nep.; *Kema kechoong*, Lepcha.

A large shrub with thin grey bark. Wood grey, moderately hard, even-grained, warps. Annual rings not visible. Pores very small. Medullary rays short, fine.

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Weight, 42 lbs. per cubic foot. The leaves are poisonous and the smoke of the wood causes inflammation of the face and eyes, according to Hooker. Flowers scarlet.

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E 2958.	Sandúkpho, Darjeeling, 12,000 feet	42

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„	III.—Theophrasteæ	*Reptonia.*

Wood compact, close-grained. Pores very small or extremely small, often in groups and radial or oblique lines. Medullary rays distant, broad.

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Contains 10 to 12 species of shrubs or trees. *M. indica* A. DC.; Beddome cxxxvii.; Brandis 283; Kurz ii. 99; Gamble 52 (*Bæobotrys indica*, Roxb. Fl. Ind. i. 557) Vern. *Kalsís*, Kumaun; *Atki*, Bombay; *Bilauní*, Nep.; *Phadupjoh*, Mechi; *Ramjani*, Beng.; *Tamomban*, Magh, is a shrub of the Sub-Himalayan tract from the Ganges to Assam, Bengal, South India and Burma. *M. argentea*, Wall.; Brandis

283 Vern *Phusera, gogsa*, H... o shrub of the outer Himalaya, in ... amble 52 Vern *Phusera* Kumaun; ...all tree of the North East Himalaya, ... *ea* Wall, Kurz ii 99 Vern *Mal* ... Chittagong, Burma and the Anda... ... Kurz to have a brown, heavy, close-
... wood

1. M. montana, A DC, under *M indica*, A DC in Brandis 283, Gamble 52 Vern *Bilauni*, Nep, *Purmo*, Lepcha

An evergreen, gregarious shrub or small tree Bark thin, reddish brown Wood soft Pores small, scanty, uniformly distributed Medullary rays moderately broad, numerous

North East Himalaya from Nepal eastwards ... ma (var *B elongata* = ... ike dense secor... Bhutan Hill...
... rings per inch of radius, used only for fuel and rough house posts

E 2389 Tukdah Forest, Darjeeling, 6,000 feet

2. MYRSINE, Linn

Contains 3 to 5 species *M capitellata* Wall, Beddome t 231, Brandis 286 (*M avenis*, DC, Kurz ii 105), is a small tree of Eastern Bengal South India Ceylon and Burma, said by Beddome to have a hard and durable timber Weight, 22 lbs (Wallich)

1. M. semiserrata, Wall, Brandis 285, Kurz ii 105, Gamble 52. Vern *Parwana, kungkung gogsa, bamora, gaunta*, Hind, *Chupra*, Kumaun, *Bilsi, beresi, kalikatha, bilauni*, Nep, *Tungcheong*, Lepcha

A shrub, small or middling sized tree Bark ash coloured, dark, nearly black, with prominent dots Wood red, hard Pores extremely small, in small patches between the distant, broad medullary rays

Outer Himalaya from the Beas to Bhutan, from 3 000 to 9 000 feet Nattoung Hills of Martaban

Wallich says the wood is chocolate coloured, heavy, hard handsome and used in Nepal for carpenters work It splits rather and is usually too small for anything but firewood

		lbs
H 2830	The Glen Simla 6 000 feet	51
E 3322	Darjeeling 6 500 feet	...

2. M. africana, Linn, Brandis 286 Vern *Bebiang, kakhum, kokhuri, kaiuk, gugul, jutru, chachii, pratshu, branchu, khushin, papri, bandáru, bínsin, atukjan*, Pb, *Guvaini, pahari cha, chupra*, North-Western Provinces

A small, evergreen shrub Wood white, moderately hard Pores extremely small, often in short radial lines, between the distant, fine medullary rays

Afghanistan Salt Range and ...
Fruit used as an anthe... and often used as a substitute for that of ... might be useful for hedges

H 2829 Simla 6 000 feet

3. SAMARA, Linn.

Contains about 10 species of shrubs or climbers, of which most are found in Eastern Bengal, South India and Burma. *S. Ribes*, Benth. and Hook. f. (*Embelia Ribes*, Burm.; Roxb. Fl. Ind. i. 586; Beddome cxxxviii.; Brandis 284; Kurz ii. 101; Gamble 53). Vern. *Bebrang*, Sylhet; *Himalcheri*, Nep.; *Kárkannie*, Bombay, is a large climber of Eastern and Northern Bengal, South India, Ceylon and Burma. The berries are used as an anthelminthic, and are used to adulterate black pepper. *S. floribunda*, Bth. and Hook. f. (*Embelia floribunda*, Wall.; Kurz ii. 102; Gamble 53). Vern. *Himalcheri*, Nep.; *Payong*, Lepcha, is a large climber of the hills of Sikkim and of Nattoung in Burma. It has a pinkish-white wood with very broad medullary rays and large regular pores, sometimes subdivided and often in concentric lines. (E 3294, Sepoydura, Darjeeling, 6,000 feet.) *S. frondosa*, King; Gamble 52. Vern. *Amili*, Nep.; *Monkyourik*, Lepcha, is a common climber of the Darjeeling forests.

1. S. robusta, Benth. and Hook. f. *Embelia robusta*, Roxb. Fl. Ind. i. 587; Beddome cxxxvii.; Brandis 284; Kurz ii. 102; Gamble 53. Vern. *Amti, ambat, barbatti, byebering*, Bombay; *Bebrang*, Oudh; *Kopadalli*, Gondi; *Bharangeli*, Kurku; *Kalay bogoti*, Nep.; *Aipmwaynway*, Burm.

A large shrub or small tree. Bark ¼ inch thick, brown, with horizontal cracks. Wood reddish. Pores small, often in groups or short radial lines, the transverse diameter many times smaller than the distance between the extremely broad medullary rays. Yellow spots shewing in the middle of the rays.

Sub-Himalayan tract from the Jumna eastwards, Bengal, Behar, Western India and Burma.

		lbs.
O 2478.	Gonda, Oudh	37.

2. S. undulata, Benth. and Hook. f. *Choripetalum undulatum*, A. DC.; Gamble 53. Vern. *Amilpati*, Nep.

A climbing shrub. Bark brown, with prominent lenticels. Wood yellowish white, moderately hard. Pores moderate-sized, more numerous in the inner part of each annual ring. Medullary rays moderately broad to broad, short, well defined.

North-East Himalaya, 3,000 to 6,000 feet.

E 3302. Tukdah, Darjeeling, 5,000 feet.

4. ARDISIA, Sw.

Shrubs or small trees. Brandis describes 2 from the North-Western Himalaya; Beddome 9 species from South India and Ceylon; and Kurz 20 from Burma and the Andamans; while a large number occur in the North-Eastern Himalaya and Eastern Bengal. *A. humilis*, Vahl.; Beddome cxxxix.; Brandis 287; Kurz ii. 110; Gamble 53 (*A. solanancea*, Roxb. Fl. Ind. i. 580), Vern. *Ban-jam*, Beng.; *Kadna*, Cuttack; *Conda-mayúr*, Tel.; *Kantena, maya rawa*, C. Prov.; *Bodina gidda*, Mysore; *Gyengmaope*, Burm., is a large shrub of the moister zones of India and Burma, extending as far to the north-west as the Jumna. *A. floribunda*, Wall.; Brandis 287; Gamble 53, is a small tree of the Sub-Himalayan tract from the Jumna to Assam. *A. pauciflora*, Heyne, *A. paniculata*, Roxb., *A. rhomboidea*, Wight, and *A. elliptica*, Thunb.; Beddome cxxxviii., are common small trees of South India and Ceylon.

1. A. crispa, DC.; Kurz ii. 113. *A. crenulata*, Vent.; Gamble 53. Vern. *Chamlani*, Nep.; *Denyok*, Lepcha.

A small erect shrub. Wood white, moderately hard. Pores extremely small. Medullary rays short, broad.

elevations
winter Very

E 3315 Pugraingbong, Darjeeling, 6,000 feet

5. ÆGICERAS, Gaertn.

1. Æ. corniculata, Blanco; Kurz ii. 114 *Æ majus,* Gaertn.; Beddome cxxxix.; Roxb. Fl. Ind. iii. 130. Vern. *Halsi, khalshi,* Beng., *Bootayet,* Burm.

A small evergreen tree. Bark grey, ¼ inch thick. Wood hard, close-grained. No annual rings Pores small, uniformly distributed Medullary rays short, scanty, between moderately broad and broad

Coast forests and tidal creeks of the Western Coast, Bengal, Burma and the Andaman Islands

Weight, 40 lbs per cubic foot Wood used for firewood and for native huts in Jessore.

		lbs
E 406	Sundarbans	40

5. REPTONIA, A. DC.

1. R. buxifolia, A. DC, Brandis 287. Vern *Gurar,* Afg., *Gúrgúra,* Punjab.

A large evergreen shrub or small tree. Bark thin, dark grey, brown, d even- wavy, arying

and darker tissue into irregularly-shaped figures, in which the fine, numerous and regularly distributed medullary rays are visible.

worthy of attention The fruit is

		lbs
P 169	Kohat	71
P 912.	Salt Range	

ORDER LXIV. SAPOTACEÆ.

3. SAMARA, Linn.

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A large shrub or small tree. Bark ¼ inch thick, brown, with horizontal cracks. Wood reddish. Pores small, often in groups or short radial lines, the transverse diameter many times smaller than the distance between the extremely broad medullary rays. Yellow spots shewing in the middle of the rays.

Sub-Himalayan tract from the Jumna eastwards, Bengal, Behar, Western India and Burma.

		lbs.
O 2478.	Gonda, Oudh	37.

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North-East Himalaya, 3,000 to 6,000 feet.

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1. A. crispa, DC.; Kurz ii. 113. *A. crenulata*, Vent.; Gamble 53. Vern. *Chamlani*, Nep.; *Denyok*, Lepcha.

A small erect shrub. Wood white, moderately hard. Pores extremely small. Medullary rays short, broad.

Eastern Himalaya from 4 000 to 8 000 feet Martaban at similar elevations
Has pretty wax like flowers and bright red berries which ripen in winter Very commom undergrowth in the hill forests

E 3315 Pugraingbong Darjeeling 6 000 feet

5 ÆGICERAS Gaertn

1 Æ corniculata, Blanco, Kurz ii 114 *Æ majus*, Gaertn, Beddome cxxxix, Roxb Fl Ind iii 130 Vern *Halsi, Khalshi*, Beng, *Bootayet*, Burm

A small evergreen tree Bark grey, ¼ inch thick Wood hard, close grained No annual rings Pores small, uniformly distributed Medullary rays short, scanty, between moderately broad and broad

Coast forests and tidal creeks of the Western Coast Bengal Burma and the Andaman Islands
Weight 40 lbs per cubic foot Wood used for firewood and for native huts in Jessore

		lbs
E 106	Sundarbans	40

5 REPTONIA, A DC

1 R buxifolia, A DC, Brandis 287. Vern *Garar*, Afg, *Gurgura*, Punjab

A large evergreen shrub or small tree Bark thin, dark grey, tesselated by deep longitudinal and transverse cracks Wood light brown, with irregular purplish-brown heartwood, very hard, heavy close and even grained Annual rings indistinct Pores very small arranged in wavy, radial, branching and anastomosing narrow white belts, of varying width, joined by fine, wavy, concentric lines which divide the firmer and darker tissue into irregularly shaped figures, in which the white, fine numerous and regularly distributed medullary rays are distinctly visible

Salt Range and hills Trans Indus
Weight 71 lbs per cub c foot Wood worthy of attention The fruit is eaten and the seeds are strung in rosaries

		lbs
P 169	Kohat	71
P 912	Salt Range	

ORDER LXIV SAPOTACEÆ

in gardens in India as far north as Saharanpur for its fine, good-flavoured fruit. *Isonandra Wightiana*, DC.; Beddome cxli., is a common tree of the Western Gháts and Ceylon. *I. obovata*, Griff.; Kurz ii. 120 (probably *Dichopsis*), is an evergreen tree of Tenasserim yielding a sort of gutta-percha (B 2087, Tavoy, from Wallich, 1828, is perhaps this).

The *Argan* tree of Morocco which is found growing gregariously in forests in the Atlas Mountains is *Argania Sideroxylon*, R. S. Its leaves and fruit are used for fodder and an oil resembling olive oil is extracted from the seeds.

Wood hard, smooth, durable. Heartwood dark-coloured, generally red. Pores small and moderate-sized, in short, wavy, radial lines, which are frequently oblique. Medullary rays numerous, fine, equidistant, joined by fine, transverse bars or concentric lines of softer texture.

1. CHRYSOPHYLLUM, Linn.

1. C. Roxburghii, G. Don; Beddome t. 236; Thwaites Enum. 174; Kurz ii. 118. *C. acuminatum*, Roxb. Fl. Ind. i. 599. The Star Apple. Vern. *Pelakara*, Beng.; *Pithogarkh*, Ass.; *Hali*, Kan.; *Tarsi*, Mar.; *Lawúlú*, Cingh.; *Thankya*, Burm.

An evergreen tree. Wood white, close-grained, moderately hard. Pores small, in short radial lines between the numerous, very fine medullary rays.

Bengal, Burma, Western Gháts and Ceylon.

Weight, according to A. Mendis, 39 lbs. per cubic foot; Kyd gives weight 40·5 lbs. and P = 710. Wood used for building. Fruit edible.

	lbs.
No. 48. Ceylon Collection (called *Sideroxylon* sp.)	39

2. SARCOSPERMA, Hook. f.

Two trees of the Eastern Himalaya: *S. Griffithii*, Hook. f., and *S. arborea* Hook. f. (*Sideroxylon arboreum*, Ham.; Kurz in Trans. As. Soc. Beng. xlvi. ii. 229; Gamble 53). Vern. *Pahar lampati*, Nep.; *Kulyatzo*, Lepcha, a large tree of the Eastern Himalaya which is used in Sikkim to make canoes.

No. E 3316 from Chenga Forest, Darjeeling Terai, is probably this. Bark light-reddish brown, thin; wood pink, moderately hard, rather light (30·5 lbs. per cubic foot). Pores moderate-sized, in long wavy, radial lines. Medullary rays very numerous, fine, equidistant, the distance between two rays much less than the diameter of the pores. Concentric lines very indistinct.

3. DICHOPSIS, Thw.

About 3 species: *D. elliptica*, Benth. and Hook. f. (*Bassia elliptica*, Dalz.; Beddome t. 43). Vern. *Panchoti pala*, Tam.; *Panchonta*, Kan., is a very large tree of the Western Gháts, affording a good timber and an inferior description of gutta-percha. *D. caloneura*, Bth. and Hook. f. (*Isonandra caloneura*, Kurz ii. 119), is a tree of the Andaman Islands. *D. Gutta*, Bth. and Hook. f. (*Isonandra Gutta*, Hook.), is the tree which yields the "Gutta-Percha" of commerce, of which large quantities are exported to Europe from Singapore and the Malay Archipelago, where the tree is indigenous.

1. D. polyantha, Benth. and Hook. f. in Gen. Plant. ii. 658. *Bassia polyantha*, Wall. *Isonandra polyantha*, Kurz ii. 119. Vern. *Tali*, Beng.; *Sill-kurta*, Cachar; *Thainban*, Magh.

A moderate-sized evergreen tree. Wood red, hard. Pores moderate-sized, in wavy radial lines, sometimes slightly oblique. Medullary rays very fine, not prominent. Fine, wavy, parallel and equidistant concentric lines.

Cachar Chittagong and Arracan

Weight, 53 lbs per cubic foot Much valued in Cachar and Chittagong Mann says it does not float but he must refer to green wood Kurz says it yields a good *quality of gutta percha in large quantity* Major Lewin says it is used in Chittagong for making beds tools, &c and is sawn into boards for the Calcutta market

		lbs.
F 1274	Cachar	53
E 1434	Sylhet	
E 1952	Chittagong	53
E 3285	Rinkheong Reserve Chittagong	

4 BASSIA, Kon

Contains 3 species of Indian trees with milky juice useful for their timber as well as for many other products

Wood moderately hard, heartwood red Pores moderate-sized, in short radial lines Medullary rays equidistant, the distance between the rays less than the transverse diameter of the pores

1. B latifolia, Roxb Fl Ind ii 526, Beddome t 11, Brandis 289 Vern *Mahwa, mowa, mahua,* Hind , *Mahwa, mahula maul,* Beng , *Moha,* Uriya , *Illupi, elupa, kat illipi,* Tam , *Ippi, yeppa,* Tel , *Mahu,* Baigas, *Irup, irrip, irhu,* Gondi , *Mohu,* Kurku , *Moho,* Mai , *Honge,* Kan , *Poonam,* Mal , *Quindah* (the oil)

A large deciduous tree Bark ½ inch thick, grey, with vertical cracks, exfoliating in thin scales Sapwood large, heartwood reddish brown, from hard to very hard Annual rings indistinct. Pores moderate sized, not numerous, in short, sometimes oblique, radial, wavy lines between the numerous, fine, medullary rays, which are joined by numerous parallel, fine, transverse bars

Indigenous in the forests of Central India Cultivated and self sown throughout India

The weight and transverse strength have been determined by the following experiments —

Experiment by whom made	Year	Wood whence procured	Weight	Number of experiments	Size of bar	Value of P
					Ft In I	
Cunningham	1854	Gwalior	63	1	2 × 1 × 1	715
Skinner No 22	1862	South India	66			00
Fowke	1859		63			685
R Thompson	1868	Central Provinces	53			
List	1873		66			
Smythies	1878	As below	64	9		

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or furniture
y parts of

India, t
into a c
Bengal,
in Chota
right of
owners,

flowers are usually eaten mixed with *sál* seeds or leaves of other plants. Full description of the collection in Palamow is given by Mr. L. R. Forbes quoted at page 213 of the same Volume. In that description he says that in the Palamow Sub-division there are nearly 114,000 *mahua* bearing trees. He says the average yield of a tree is about 2½ maunds, and that the flowers sell at about 12 annas per maund. The fruit, ripe or unripe, is eaten; it has two envelopes, the outer two of which are eaten raw or cooked as a vegetable, and the inner one is dried and ground into meal. From the kernel a greenish yellow oil is obtained, which is eaten by the Gonds and other Central Indian tribes, and is used to adulterate ghee and in soap-making. It solidifies at a low temperature, but melts at a temperature of 110°; and though it keeps well in a cold climate, in a hot one it soon becomes rancid and separates into two parts, a clear fluid oil above, and a thick brown substance below. One seer of oil is obtained from 4 seers of kernels.

		lbs.
O 266.	Garhwal (1868)	60
O 1493.	Kheri, Oudh	65
H 2969.	Kumaun, 5,000 feet	66
C 827.	Bairagarh Reserve, Berar	69
C 2771.	Melghát, Berar	...
C 1116.	Ahiri Reserve, Central Provinces	60
C 2731.	Moharli Reserve, Central Provinces (young)	52
C 1243.	Gumsúr, Madras	63

2. B. longifolia, Willd.; Roxb. Fl. Ind. ii. 523; Beddome t. 42; Brandis 290. Vern. *Kat illupi, elupa,* Tam.; *Ippi, yeppa, pinna,* Tel.; *Hippe,* Kan.; *Ellupi,* Mal.; *Mee,* Cingh.

A large evergreen tree. Heartwood red, moderately hard, close-grained. Pores moderate-sized, prominent on a vertical section, in short radial lines between the uniform, equidistant, numerous, fine medullary rays which are joined by fine transverse bars.

South India and Ceylon.

Weight, according to Skinner, No. 23, 60 lbs.; Adrian Mendis 61 lbs. Skinner, gives P = 730, Mendis 724. Beddome says it is very flexible and durable; that it is valued for ship's keels, for trenails and for planking below the water line; and that it is used for carts, furniture and bridge construction. The flowers are eaten in the same way as those of *B. latifolia,* and an oil is expressed from the ripe fruit, which is yellow, semi-solid and used for burning, for soap, and to adulterate ghee. It is also used medicinally, as well as the leaves, bark and the juice of the bark and young fruit.

		lbs.
No. 53.	Ceylon Collection	61

3. B. butyracea, Roxb. Fl. Ind. ii. 527; Brandis 290; Gamble 53. Vern. *Chiúra, chaiúra, phulel,* Kumaun; *Cheuli,* Oudh; *Phalwara,* Hind.; *Chúri,* Nep.; *Yel, yel pote,* Lepcha.

A deciduous tree. Bark ½ inch thick, dark grey, wood light brown, hard. Annual rings marked by a dark line. Pores moderate-sized, somewhat smaller than those of *B. latifolia,* in radial lines of different length between the numerous equidistant, fine medullary rays, which are joined by fine transverse bars.

Sub-Himalayan tract from Kumaun to Bhutan, between 1,500 and 4,500 feet.

Growth fast, 3 to 4 rings per inch of radius. Weight, 52 lbs. per cubic foot. The pulp of the fruit is eaten, and from the seeds a vegetable butter is extracted, of the consistence of fine lard and of a white colour. It does not melt under 120° and keeps a long time without deteriorating. It makes good soap, and is useful for candles as it is said to burn without smoke or unpleasant smell. When perfumed, it is used as an ointment and as an external application for rheumatism. The flowers are not eaten. The bark is used in Sikkim to poison fish.

		lbs.
E 622.	Bamunpokri, Darjeeling	52

5 PAYENA, A DC

Two species *P paralleloneura* Kurz ii 121 is an evergreen tree of the tropical forests of Martaban and Tenasserim

1. P. lucida, DC, Kurz ii 121 *Ceratophorus Wightii*, Hassl *Isonandra polyandra*, Wight Icon t 1589 Vern *Dolu-kurta*, Cachar

An evergreen tree Wood red, hard Pores moderate-sized, in short radial lines. Medullary rays very fine, very numerous, uniform, equidistant Numerous parallel, wavy, concentric lines, not very prominent

Cachar, Tenasserim (?)

Weight 45 lbs per cubic foot The wood is used for planking

		lbs
E 1275	Cachar	45

6 MIMUSOPS, Linn

Contains 4 Indian species *M Roxburghiana*, Wight, Beddome exli, Brandis

building and for gun stocks

Evergreen trees Heartwood red, very hard Pores small, in oblique lines The distance between the rays equal to, or larger than, the transverse diameter of the pores Numerous wavy, concentric lines

1. M Elengi, Linn, Roxb Fl Ind ii 236, Beddome t 40, Brandis 293, Kurz ii 123 Vern *Bukal, bohl*, Beng, Mar, *Mulsari, maulser*, Hind, *Magadam*, Tam, *Pogada*, Tel, *Bokal, boklu, mugali*, Kan, *Barsoli*, Meywar *Varoli, ovalli*, Mal, *Elengi*, Mal, *Khaya*, Burm, *Moonemal* Cingh

A large evergreen tree Bark dark grey, rough, deeply cracked with vertical and transverse fissures Sapwood large, whitish, very hard Heartwood red Pores small, in short lines, which are generally radial, but often irregular Medullary rays very fine, very numerous, uniform and equidistant Many parallel, wavy, concentric bands

W... the Weste... Gh... ts f... n... rth... Kh... nd... N... rth... Ci... B...

		lbs
W 1223	North Kanara	62
D 1073	Arcot	...
B 2221	Andaman Islands	60
B 2241		58
No 56	Ceylon Collection	61
No 13	Salem Collection (marked *Bassia longifolia*)	87

2. M. indica, A. DC.; Brandis 291. *M. hexandra,* Roxb. Fl. Ind. ii. 238.; Beddome cxli. Vern. *Khír, khirni,* Hind.; *Rain,* Meywar; *Palla, kannu palle,* Tam.; *Palle panlo, palla pandu,* Tel.; *Khirni,* Mar.; *Raini,* Gondi; *Palú,* Cingh.

A large evergreen tree. Heartwood red, very hard. Pores small, in wavy, radial and oblique lines. Medullary rays fine, uniform, equidistant, very numerous. Concentric wavy lines irregularly distributed and less prominent than in *M. Elengi.*

Mountains of South India extending in Central India to the sandstone hills of Pachmarhi, north of the Godavari. It is only found on sandstone, and frequently associated with *Buchanania angustifolia* and *Hardwickia binata.*

Weight, Skinner, No. 95, gives 70 lbs.; A. Mendis 68 lbs.; our specimen gives only 60 lbs. per cubic foot. Skinner gives P = 944, Mendis 1,052. The wood is tough, even-grained and durable; it is used for sugar-mill beams, oil-presses, house-posts and for turning. The fruit is eaten.

		lbs.
D 1283.	Anamalai Hills	60
No. 65.	Ceylon Collection	68

3. M. littoralis, Kurz ii. 123. *M. indica,* Kurz, And. Report; Brandis 292. Andaman Bullet Wood. Vern. *Kappali,* Burm.; *Dogola,* And.

A large evergreen tree with thin, smooth, dark-brown bark. Wood red, smooth, very hard and close-grained. Pores extremely small, elongated, subdivided, often in radial lines. Medullary rays very fine, very numerous, uniform and equidistant. Numerous parallel, equidistant, fine, wavy, concentric lines.

Coast forests of the Andaman Islands and Tenasserim, in the Andamans, forming nearly pure forests on the level lands behind the beach and the mangrove swamps.

The weight and transverse strength have been determined by the following experiments:—

Experiment by whom conducted.	Year.	Wood whence procured.	Weight.	Number of experiments.	Size of bar used.	Value of P.
					Ft. In. In.	
Brandis . .	1864	Andamans	67	7	6 × 2 × 2	748
„ . . .	„	„	66	7	6 × 2 × 1½	963
„ . . .	„	„	68	11	2 × 1 × ¾	1,001
„ . . .	„	„	71	5	2 × 1 × 1	779
„ . . .	1865-66	„	65	3	6 × 2 × 2	981
„ . . .	„	„	64	1	6 × 2 × 1½	1,090
„ . . .	„	„	68	8	2 × 1 × ¾	1,266
Bennett . .	1872	„	66	...	......	1,128
Smythies . .	1878	„	72	3	......	......

The wood is handsome, it is close-grained and durable, but apt to split. It is used in the Andamans for bridges and house-posts, and Major Ford (1866) said it had been sent to Calcutta to be tried for sleepers. He also says the bark is used to give a red dye.

		lbs.
B 513.	Andaman Islands	41
B 2212.	„ „ (1866)	75
B 2497.	„ „ (Home, 1874, No. 6)	72

ORDER LXV EBENACEÆ.

Containing 2 Indian Genera of trees or shrubs *Maba* and *Diospyros* A full description of all the species of this Order is found in Mr W P Hiern's Monograph of the Ebenaceæ Cambridge Phil Soc Trans xii 1873

Maba contains 5 species *M nigrescens* Dalz and Gibs Bombay Flora, p 142 Vern *Raktrura*, Kan, is a small tree of the Western Ghats *M buxifolia* Pers, Beddome cxlviii Kurz ii 139 (*Ferreola buxifolia* Willd, Roxb Fl Ind iii 790) Vern *Iramballi eruvalli humbilli* Tam, *Nella maddi alli pishinna* Tel, *Kalu habaraleya* Cingh, *Mepyoung* Burm, is a small evergreen tree of South India and Tenasserim, it is said to have a dark coloured, hard and durable wood weighing according to Skinner No 89 58 lbs, P = 875 *M micrantha* Hiern (*Holochilus micranthus*, Dalz, Beddome cxlvii) is a tree of the Sahyadri hills of the Bombay Ghats *M merguiensis*, Hiern, Kurz ii 139, is a small tree of the Mergui Archipelago *M andamanica* Kurz ii 140 is an evergreen shrub of the Andaman Islands (*see page 253*)

1 DIOSPYROS, Linn

Contains 41 or 42 species From the list given below, which has been taken from Mr Hiern's Monograph it will be seen that 4 species are found in Northern India, 15 each in Burma and South India 9 in Eastern Bengal and 6 in the Andamans, most of the Ceylon species have been omitted —

Section I MELONIA—

1	*D insignis*, Thw	S India Ceylon
2	*D Tupru* Buch	N India
3	*D Melanoxylon* Roxb	S India
4	*D sylvatica* Roxb	S India Ceylon
5	*D Kurzii*, Hiern	Andamans
6	*D ehretioides* Wall	Burma
7	*D hirsuta* Linn f	S India Ceylon
8	*D burmanica* Kurz	Burma
9	*D densiflora*, Wall	Burma

Section II EBENUS—

10	*D oocarpa* Thw	S India, Ceylon
11	*D quæsita*, Thw	Ceylon

Section III NOLTIA—

12	*D Brandisiana* Kurz	Burma
13	*D pruriens* Dalz	S India Ceylon

Section IV GUNISANTHUS—

14	*D foliolosa*, Wall	S India
15	*D pilosula*, Wall	E Bengal Burma Andamans
16	*D paniculata*, Dalz	S India

Section V GUIACANA—

17	*D Horsfieldii*, Hiern	Burma

Section VII EBMELINUS—

18	*D stricta* Roxb	E Bengal
19	*D variegata* Kurz	Burma
20	*D dasyphylla* Kurz	Burma
21	*D oleifolia* Wall	Burma
22	*D flavicans* Hiern	Burma Andamans
23	*D sapotoides* Kurz	Burma
24	D *nigricans* Wall	E Bengal
25	*D Ebenum*, Kon	S India, Ceylon,

Section VIII. PATONIA—

26.	*D. lanceæfolia*, Roxb.	E. Bengal.
27.	*D. undulata*, Wall.	Burma, Andamans.

Section IX. LEUCOXYLON—

28.	*D. buxifolia*, Hiern	S. India.

Section X. DANZLERIA—

29.	*D. montana*, Roxb. / *D. cordifolia*, Roxb.	N. India, S. India, and E. Bengal.
30.	*D. Lotus*, Linn.	N. India.
31.	*D. Kaki*, Linn.	E. Bengal.
32.	*D. chartacea*, Wall.	Burma.
33.	*D. vaccinioides*, Ldl.	Andamans.
34.	*D. Chloroxylon*, Roxb.	S. India.

Section XI. PARALEA—

35.	*D. ramiflora*, Roxb.	E. Bengal.
36.	*D. ovalifolia*, Wight	S. India, Ceylon.

Section XIV. CAVANILLEA—

37.	*D. Embryopteris*, Pers.	N. India, E. Bengal, S. India, Burma, and Ceylon.

Section XV. AMUXIS—

38.	*D. Toposia*, Ham.	E. Bengal, Ceylon.

Unclassified—

39.	*D. grata*, Wall.	Nepal.
40.	*D. orixensis*, Wight	S. India.
41.	*D. pyrrhocarpa*, Miq.	Andamans.

D. insignis, Thw.; Beddome cxlv., is a large tree of the Anamalai Hills and Ceylon. *D. sylvatica*, Roxb. Fl. Ind. ii. 537; Beddome cxliii. Vern. *Tella gada*, Tel. *Kaka suroli*, Kan., is a common tree of the Western Ghâts, with a white, strong wood. *D. burmanica*, Kurz ii. 133. Vern. *Tai-beng*, Burm., is a large tree of Burma, chiefly found in the Eng forests. *D. pruriens*, Dalz.; Beddome cxliv., is a small tree of the Western Ghâts of Bombay, Mysore, Malabar and Ceylon, whose fruit is covered with stinging hairs. *D. pilosula*, Wall. (*Gunisanthus pilosulus*, DC.; Kurz ii. 125), is a tree of the hills of Sylhet, the Pegu Yoma and the Andaman Islands. *D. stricta*, Roxb. Fl. Ind. ii. 539, is a tall tree of Eastern Bengal and Chittagong. *D. nigricans*, Wall., is a tree of the Khasia Hills and Sylhet. *D. lanceæfolia*, Roxb. Fl. Ind. ii. 537; Brandis 297; Kurz ii. 136. Vern. *Ardinia*, Kumaun; *Gulal*, Beng.; *Soilo*, Khasia or Cachar, is an evergreen tree of Eastern Bengal and Tenasserim, extending westwards to Kumaun, and said by Roxburgh to have a hard, durable timber. *D. buxifolia*, Hiern (*D. microphylla*, Beddome cxlv.), is a large tree of the Anamalai Hills, Wynaad and S. Kanara. *D. Kaki*, Linn.; Roxb. Fl. Ind. ii. 527, is a fruit tree of China and Japan found by Hooker in the Khasia Hills, and said by Roxburgh to grow in Nepal. It is cultivated in India and called "*Wilayati gáb.*" *D. Chloroxylon*, Roxb. Fl. Ind. ii. 538; Beddome clxiii.; Brandis 297. Vern. *Ninai*, Bombay; *Illinda, aulanche, nella ulemira*, Tel.; *Andúli* Gondi, is a tree or large shrub of Southern India from Guzerat and Orissa southwards, having a hard and durable yellow wood. *D. ramiflora*, Roxb. Fl. Ind. ii. 535. Vern. *Gulal, uri gáb*, Beng., is a large tree of Eastern Bengal with a strong hard wood. *D. Toposia*, Ham.; Kurz ii. 128. (*D. racemosa*, Roxb. Fl. Ind. ii. 536.) Vern. *Toposi, gulal*, Beng.; *Kahakaala*, Cingh., is a tree of the mountains of E. Bengal and of Ceylon, with an edible fruit.

The structure of the wood of the different species of *Diospyros* is very uniform, and is distinguished by small pores, often in radial lines, and fine, very numerous, uniform and equidistant medullary rays, often

closely packed. In most species there are numerous wavy, concentric lines across the rays. In several respects the structure of the ebonies resembles the structure of *Sapotaceæ*.

1. **D. Melanoxylon,** Roxb. Fl. Ind. ii. 530; Brandis 294. *D. Wightiana,* Beddome t. 67. (Including *D. Tupru,* Buch.; *D. exsculpta,* Ham.; Beddome t. 66, and *D. tomentosa,* Roxb. Fl. Ind. ii. 532.) Vern. *Tendu, kendu, temru, abnus,* Hind.; *Kend, kyou,* Beng.; *Tumri, tummer, tumki,* Gondi; *Tendu,* Bhugas; *Tumri, temru, timburni,* Mar.; *Tumbi, tumbali, karunthumbi,* Tam.; *Tumi, tumki, tumida, timmuiri, damadi,* Tel.; *Kendhu,* Uriya; *Balai,* Kan.

A moderate sized tree. Bark ⅛ inch thick, greyish black, the inner substance black and charcoal-like, with numerous transverse and longitudinal cracks exfoliating in regular oblong scales. Wood hard, of a light pink colour, with irregular shaped masses of black ebony in the centre. No annual rings. Pores small, scanty, generally in radial lines. Medullary rays very fine, very numerous, equidistant and uniform, visible on a radial section. Numerous fine, wavy, concentric lines visible in the sapwood. The ebony is jet black with purple streaks, extremely hard, pores and medullary rays difficult to distinguish.

Throughout India but not in Burma.

The weight and transverse strength have been determined by the following experiments:—

Puckle in 1859 in Mysore with bars 2 × 1 × 1	found W = 75		
Skinner in 1862 No. 62		W = 80	P = 1180
Cunningham in 1854 in Gwalior with bars 2 × 1 × 1		W = 77	P = 862
The Central Provinces List of 1873	gives W = 85		

Kyd found W = 49·5, P = 547. R. Thompson 49·6: this was probably the outer wood. Wallich gives 61. Smythies measurements of our specimens give outer wood 54 lbs., ebony 72 lbs., but the good specimens with only ebony weigh 77, which is the best weight to take and which accords with Brandis statement that the weight per cubic foot varies from 75 to 80 lbs. Besides Skinner's and Cunningham's values for P, Fowke gives P = 756. The wood is used for building, shoulder poles and carriage shafts, and the ebony for all purposes of fancy work and carving. The fruit is edible.

			lbs.
P.	170.	Hoshiarpur, Punjab (Stewart 1866), the *specimen referred to* at p. 137 of the Punjab Plants	69
P.	469.	Ajmere	59
O.	1492.	Kheri, Oudh	55
O.	2981.	Bahraich, Oudh	48
C.	828.	Baragarh Reserve, Berar	53
C.	1113.	Ahiri Reserve, Central Provinces	
C.	2754.	Moharli Reserve, Central Provinces	
C.	1237.	Gumsur, Madras	65
C.	1301.		77
C.	1302.		68
D.	2008.	Mysore	73
D.	2045.		70
No.	26.	Salem Collection	82

2. **D. Kurzii,** Hiern; Kurz ii. 131. Andamanese Marble Wood. Vern. *Teakah, thitkya,* Burm.; *Pecha da,* And.

An evergreen tree ... Wood handsome, streaked w... the black wood very hard, with ... ey wood. The

2

mass of ebony occupying the centre of the tree is large and very irregular in outline, and frequently encloses interrupted concentric belts of light-coloured wood. Pores small and very small, often oval and subdivided, between the very fine and extremely numerous, uniform and equidistant, wavy, medullary rays. Numerous, very fine transverse bars across the rays.

Andaman Islands.
Weight of the ebony 80 lbs. per cubic foot; the specimens partly ebony, partly grey wood, give 57 to 62 lbs. Brandis in his Memo. of August 25th, 1874, gives 70 lbs. The wood is used for cabinet work and should be better known, as a substitute for the Ceylon Calamander wood, which it resembles in appearance. It is said by Major Ford to be used in the Andamans for handles and sheaths of blades, and for furniture. Home's surveys gave 224 trees or 1 tree per acre; so it is pretty common.

		lbs.
B 2203.	Andaman Islands (1866)	57
B 2498.	„ „ (Home, 1874, No. 15)	80
B 521.	„ „	62

3. D. ehretioides, Wall.; Kurz ii. 129. Vern. *Ouk-chingza,* Burm.
A large tree with dark-grey bark. Wood dark grey, with darker streaks, moderately hard, even-grained. Pores moderate-sized, scanty, often oval and subdivided. Medullary rays fine, numerous. Numerous fine, wavy, concentric lines across the rays.

Burma.
Weight, according to Brandis' List of 1862, No. 73, 41 lbs.; our specimens give 53 lbs. The wood is used for house-posts.

		lbs.
B 1422.	Tharrawaddi, Burma	54
B 2542.	Burma (1862)	52

4. D. oocarpa, Thw. Enum. 180. Vern. *Kadoembaireya,* Cingh.
Wood purplish brown, with black streaks, moderately hard. Pores moderate-sized. Medullary rays very fine, very numerous. Numerous fine, wavy, concentric lines.

Concan, Mysore and Ceylon.
A handsome wood. Weight, 45 lbs. per cubic foot.

		lbs.
No. 40.	Ceylon Collection (marked *Diospyros sp.*)	45

5. D. quæsita, Thwaites Enum. 179; Beddome cxlv.; Brandis 296. Calamander Wood. Vern. *Kaloomidereya,* Cingh.
A large tree. Wood hard, consisting of irregular alternate layers of black ebony and greyish brown wood. Pores scanty, moderate-sized, in short radial lines. Medullary rays fine, numerous, equidistant, traversed by innumerable wavy concentric lines.

Ceylon.
Weight, according to Adrian Mendis' List, 57 lbs. per cubic foot; Skinner, No. 62, 60 lbs.; our specimen gives 53 lbs. Skinner gives P = 751.
The most valuable ornamental wood in Ceylon; it is now scarce, but is much in demand.

		lbs.
D 2923.	S. India or Ceylon	53
No. 12.	Ceylon Collection (*D. hirsuta*)	57

6 **D. Ebenum,** Konig, Roxb Fl Ind ii 529, Beddome t 65, Brandis 296, Thwaites Enum 179 Ebony Vern *Ebans, abnus, tendu,* Hind, *Kendhu,* Uriya, *Acha, tumbi, shengutan, kaka tati, tai,* Tam, *Tuki,* Tel, *Karemara,* Kan, *Tai, tendu, abnus,* Mar, *Mallali,*

Structure of the wood similar
slightly larger, oval and subdivided, not in radial lines The structure of the ebony is exceedingly indistinct

South India and Ceylon
Weight according to Beddome 81 lbs Adrian Mendis 71 lbs our specimens give 61 to 70 lbs A Mendis gives P = 720 The wood is used for inlaying and ornamental turnery but the demand for it is not very great

		lbs
W 731	South Kanara	61
W 750		70
No 13	Ceylon Collection (marked *Diospyros* sp)	71

7. **D montana,** Roxb Fl Ind ii 538, Beddome cxliii, Brandis 296 Vern *Hirek, keindu, temru, pasendu,* Pb, *Tendu, dasaundu, lohari, bistend,* Hind, *Makar-tendi,* Banda, *Pasend,* Bhurtpur, *Temru,* Meywar, *Ambia* Banswara, *Hadru,* Panch Mehals, *Kanchan, kadal, pattewar, patwan,* C P., *Muchi tanki, yerragoda, micha tummurra,* Tel, *Timru, timburni,* Mar, *Goindu, kala goindu, balkuniki, jagalagante,* Kan

A moderate sized tree, with thin, pinkish grey, smooth bark, when old exfoliating in thick irregular flakes Wood yellowish grey, soft, no heartwood, no annual rings Pores numerous, small, in radial lines between the closely packed medullary rays, which are very fine, and on a radial section distinctly visible as horizontal plates White streaks parallel to the medullary rays

Most parts of India except Sindh the Northern Punjab and Burma
Weight 45 5 lbs per cubic foot The wood is durable and would be good for furniture

		lbs
C 192	Mandla Central Provinces (1870)	47
C 1167	Ahiri Reserve Central Provinces	44

8 **D cordifolia,** Willd, Roxb Fl Ind ii 538, Beddome cxliii, Kurz ii 130 *D montana,* Roxb (part), Brandis 296 Vern *Ban-gab,* Beng, *Vackana, kaka ulimera,* Tel, *Gyutbeng,* Burm

Wood reddish, moderately hard Pores small, often oval and subdivided Medullary rays very fine and very numerous, with fine, wavy, transverse lines across

Kurz (evidently quoting Brandis List of 1862,
60 gives 70 lbs P = 1017, but this may be a

		lbs
E 715	Chittagong (*Moishkanda* Beng *Chapraka* Magh)	45
B 2541	Burma (1862)	4[illegible]

9. D. Lotus, Linn.; Brandis 297. Vern. *Amlók*, *malúk*, Pb.

A middle-sized tree with dark-brown or black tesselated bark. Wood grey, moderately hard, close-grained. Pores small, in radial groups. Medullary rays very fine, closely packed. No concentric lines.

Punjab Himalaya, in Hazara and Keshmir, from 2,500 to 6,000 feet; Afghanistan. Beluchistan, extending to Southern Europe (*Mathieu*, Fl. For. p. 205).

Growth slow, 10 rings per inch of radius (*Brandis*). The fruit is sweetish and is eaten fresh or dried, by the Afghans; Mathieu says that in Southern France it is eaten when half-rotten like the Medlar.

H 3183. Dungagalli, Hazara, 5,000 feet.

10. D. Embryopteris, Pers.; Beddome t. 69; Brandis 298; Kurz ii. 128. *D. glutinosa*, Roxb. Fl. Ind. ii. 533. *Embryopteris glutinifera*, Roxb. Vern. *Gáb*, *makur-kendi*, Beng., Hind.; *Kúsi*, Banda; *Kendu*, Ass.; *Gusrakendhu*, Uriya; *Tumbika*, *pani-chika*, Tam.; *Tumil*, *tumika*, Tel.; *Holle-tupra*, Coorg; *Kusharta*, Kan.; *Timberee*, Cingh.

An evergreen shrub or small tree, with dark-green foliage and long shining leaves. Bark smooth, dark grey, almost black, with a greenish tinge. Wood white, moderately hard, close-grained. Pores small, scanty, in short radial lines. Medullary rays very fine, very numerous, uniform and equidistant.

Throughout India and Burma, except the arid and dry zones in the Punjab and Sindh.

Growth moderate, 7-8 rings per inch of radius (*Brandis*). Weight, our specimen gives 53 lbs. per cubic foot. Wood used in building, in Ceylon for masts and yards.

The fruit is large, reddish; it contains a viscid pulp, which is used as gum in bookbinding, and in place of tar for paying the seams of fishing-boats. Its use for "gabing" boats is general throughout the rivers of Lower Bengal and Assam. An infusion is used to render fishing-nets durable. It is full of tannin and is used in medicine as an astringent. The oil extracted from the seeds is used in native medicine.

		lbs.
O 3161.	Dehra Dún	52

11. D. pyrrhocarpa, Miq.; Kurz ii. 136. Vern. *Tay*, Burm.

An evergreen tree. Wood reddish brown, moderately hard to hard. Pores small, in short radial lines. Medullary rays very fine, closely packed, with fine transverse lines across them.

Andaman Islands.

Weight, 52 lbs. per cubic foot. Major Ford says the fruit is eaten by the Burmese and is used as a red dye for linen; that Chinese umbrellas are dyed with the juice, which also has the property of rendering them waterproof.

		lbs.
B 1991.	Andaman Islands (Kurz, 1866)	50
B 2244.	„ „ (1866)	54

12. D. *sp.* from the Andamans (B 2232, 61 lbs.) Vern. *Moong*, Burm., has very small scanty pores, often in short radial lines between the closely-packed, very fine, uniform, medullary rays. No concentric lines; white streaks parallel to the medullary rays.

Major Ford says that "the wood is hard, compact and close-grained, dark-purplish grey with narrow streaks of jet black ebony. The bark and fruit of this tree produce a beautiful black dye. The Burmese use the wood for flutes and other wind instruments, for earrings, carved images, tool handles, picture frames, &c. The black heart-

wood of large trees has a diameter of about 4 or 5 inches It may possibly be *D pilosula*, Wall

13 B 1997 *collected on the Andamans by Kurz in 1866 and marked D undulata* (Hingado) is a large tree with small black wood in the centre of large trees Wood purplish grey Pores small sometimes in short radial lines between the closely packed very fine undulating, medullary rays Weight 49 lbs Numerous wavy concentric lines

B 2472 from Andamans (*Kurz* 1866) marked *Maba* ... with bluish grey wood is similar in structure to the preceding number Weight 49 lbs per cubic foot

Order LXVI STYRACEÆ

Cont ... *Styrax* contains ... 115 Kurz ii 142 ... evergreen tree of ... ii 142 is a small ... d of gum benjamin or benzoin of inferior quality ... evergreen tree of the Martaban Hills *S Benzoin* of the Malay Archipelago yields the true Gum Benzoin which is used in medicine in perfumery and to make incense *S officinale* of the Levant yields the gum known as Storax used in medicine and perfumery

E 3320 Darjeeling 6 500 feet probably *S virgatum* Wall has a thin bark white close grained moderately hard wood with faint white regular concentric bands The pores are scanty, usually subdivided, and the medullary rays short fine very numerous

1 SYMPLOCOS, Linn

Contains 25 to 30 species of Indian trees generally small *S spicata* Roxb ... 146 Gamble 54 Vern *Bootlgani* Burghers is a ... whose leaves are used in dyeing and whose seeds are strung as beads and hung round children s necks to prevent evil *S racemosa* Roxb Fl Ind ii 539 Brandis 300 Kurz ii 144 Gamble 53 Vern *Lodh* Beng *Chamla* ... Bhutia is a common small ... chiefly in dry forests The le... ... ye in Assam

Wood white, close grained, apt to warp and split Pores very small Medullary rays very fine

1 S cratægoides, Hamilton, Brandis 298, Kurz ii 147 Vern *Lu, landar, loj, losh,* Pb , *Lodh,* Kumaun , *Loja,* Sutlej

A large shrub or small tree Bark light grey, corky, with long vertical cracks Wood white, hard, close grained, splits and twists in seasoning Pores small and very small, uniformly distributed Medullary rays numerous, fine and very fine Annual rings visible

Himalaya from the Indus to Assam between 3 000 and 8 000 feet Khasia Hills, Hills of Martaban

Growth slow, 15 rings per inch of radius. Weight, 45 to 54 lbs. per Wood durable, has been recommended for turning and would do for carving properly seasoned. The leaves and bark give a yellow dye. This may be the tree on which, according to Mr. Brownlow of Cachar, the silkworms *Attacus At* and *A. Canningi* are fed.

		lbs.
H 54.	Nagkanda, Simla, 7,000 feet	54
H 2880.	" "	...
H 3018.	Kotgarh, " " "	...
H 429.	Kuruwa Forest, Jaunsar, 6,000 feet	45

2. S. lucida, Wall.; Kurz ii. 143; Gamble 54. Vern. *Khara* Nep.; *Chashing*, Bhutia.

A small evergreen tree. Bark thin, brown. Wood white, sof Annual rings distinctly marked by a continuous line of pores. Pores ver small, numerous. Medullary rays fine and very fine, numerous.

Sikkim Himalaya and hills of Martaban.

Growth moderate, 6 to 11 rings per inch of radius. Weight, 36 lbs. per cubic foot. Used for fuel and rough house-posts.

		lbs.
E 2390.	Rangbúl Forest, Darjeeling	36

3. S. ramosissima, Wall.; Brandis 299; Gamble 54. Vern. *Lodh*, Hind.; *Kala kharani, silingi*, Nep; *Tungchong*, Lepcha.

A small evergreen tree with dark red bark. Wood white, soft, even-grained. Pores numerous, very small. Medullary rays fine and very fine, unequally distributed. Annual rings visible.

Himalaya from the Jumna to Bhutan ascending to 7,500 feet, Khasia Hills.

Growth moderate, 6 to 9 rings per inch of radius. Weight, 37 lbs. per cubic foot. Brandis says that in Sikkim the yellow silkworm is fed on its leaves.

		lbs.
E 367.	Rangbúl, Darjeeling, 7,000 feet	37
E 3336.	Rangirúm, Darjeeling, 6,000 feet	...

4. S. *sp.*; Gamble 54. Vern. *Lal chandan*, Nep.

Wood white, soft, close-grained. Annual rings marked by a whit line. Pores extremely small. Medullary rays fine, numerous. Wooc vith vertical streaks of bright red colour; the red wood, which is most bundant in the root, is pounded and used for caste marks by Nepalese.

		lbs.
E 370.	Kalapokri, Darjeeling, 9,000 feet	45
E 2391.	Thosum La, Dumsong, 8,000 feet	...

(It is possible that this may prove to be *Daphniphyllum himalayense*, Müll. Arg.)

ORDER LXVII. OLEACEÆ.

Contains 10 Indian Genera, belonging to 4 Tribes, *viz.*:—

Tribe I.—Jasmineæ	*Jasminum* and *Nyctanthes.*
" II.—Syringeæ	*Schrebera* and *Syringa.*
" III.—Fraxineæ	*Fraxinus.*
" IV.—Oleineæ	*Osmanthus, Linociera, Olea Ligustrum* and *Myxopyrum.*

yctanthes Arbor-tristis, Linn.; Roxb. Fl. Ind. i. 86; Beddome t. 240; Brandis Kurz ii. 155. Vern. *Har, siháru, harsinghar, saherwa, seoli, nibari*, Hind.; *nghar, sephálíká*, Beng.; *Pakúra, ladúri, kúri*, Pb.; *Sháli*, Meywar;

Kirsahir, Bagas; *Khersari* Gondi *Gongo seoli* Uriya, *Khirasli* Mar, *Karassi* Bhil, *Minjapu paghala*, Tam, *Peghada karchid* Tel, *Hursing* Kan, *Tsay beeloo* Burm is a large shrub of the Sub-Himalayan forests from the Chenab to the Sarda Oudh Bengal Central India and Burma with a brown, close-grained wood used only for fuel The leaves are used for polishing wood, and the flowers give an orange dye It is often cultivated for ornament *Myropyrum smilacifolium* Bl Kurz ii 160 is a climbing shrub of the Darjeeling Terai Eastern Bengal Chittagong and Martaban

Wood with few exceptions light coloured, moderately hard or hard, most species without heartwood In the genera *Fraxinus, Jasminum, Syringa* and *Ligustrum*, the annual rings are marked by continuous lines or belts of pores In the other genera the pores are small and uniformly distributed, except in *Osmanthus*, where they are in reticulate tails Medullary rays sharply defined

1 JASMINUM, Linn

Contains a large number
J Sambac Aiton Roxb Fl
Hind *Mallikaphal* Beng
vated throughout India
(*J pubescens* Roxb Fl Ind i
Nep is a common shrub of the Sub Himalayan tract from the Jumna eastwards Bengal and the Central Provinces

1 J revolutum, Sims, Brandis 313 Vern *Chamba, juari, tsonu, tsuman, summun, kuja*, Pb, *Sonajahi*, Kumaun

A small shrub with soft, thin, grey bark Wood white, moderately hard, even grained Annual rings marked by a narrow continuous belt of pores, which are small, while the pores in the outer part of the ring are extremely small Medullary rays extremely fine, very numerous

Afghanistan Salt Range Himalaya from the Indus to Nepal Nilgiris and Ceylon Growth slow 25 to 40 rings per inch of radius

		lbs
H 2891 H 3027	Nagkanda Simla 7 000 feet	45

i 150
culti
s 313
Dassi
ot the Salt Range
8 000 feet) have

2 SCHREBERA, Roxb

1 S swietenioides, Roxb Fl Ind i 109, Beddome t 248, Brandis 305, Kurz ii 156 Vern *Moka, góki, ghant, gantha*, Hind, *Patali, ghanta pati*
linga, Tam
Kurku, *B*

A deci
irregular scales Wood brownish grey, hard, close grained, polishes well No heartwood, but irregular masses of purple or claret coloured wood in the centre, and scattered throughout the tree Annual rings indistinct Pores small, uniformly distributed, often in radial groups

Medullary rays fine, numerous, uniform and at equal distances, conspicuous on a radial section as narrow plates.

Kumaun, Burma, Central and South India.
Weight, 56 lbs. per cubic foot; Brandis says 50 lbs. The wood is durable, works freely and does not warp or split. It is used for combs, weavers' beams and turning.

		lbs.
C 829.	Bairagarh Reserve, Berar	59
C 2772.	Melghát, Berar	...
C 193.	Mandla, Central Provinces (1870)	51
C 1108.	Ahiri Reserve, Central Provinces	...
C 1410.	Moharli " "	...
B 1413.	Burma	59
B 3149.	" (1862)	54

3. SYRINGA, Linn.

Contains 2 species. *S. persica*, Linn.; Brandis 306. Vern. *Hiásmín*, Kashmir, is a glabrous shrub found wild by Dr. Stewart at 8,000 feet on the Suliman Range and cultivated in the Punjab and Kashmir. *S. vulgaris*, Linn., is the "Lilac" so much prized in European gardens and occasionally cultivated in the Himalaya.

1. S. Emodi, Wall.; Brandis 306. Vern. *Ban phúnt, ban dakhúr, banchír, razli, juari, rangkrún, kehimu, lolti, leila, shafri, shapri, duden, chilanghati,* Pb.; *Ghia,* Kumaun.

A large shrub with grey bark, $\frac{1}{10}$ inch thick. Wood smooth, hard, with a small, dark-coloured heartwood. Annual rings well marked by a narrow porous belt. Pores small in the spring wood, extremely small and arranged in irregular groups in the autumn wood. Medullary rays fine, numerous.

Safed-koh, North-West Himalaya from the Indus to the Sarda, ascending to 11,000 feet.
Growth slow, 20 rings per inch of radius. Weight, 59 lbs. per cubic foot.

		lbs.
H 2911.	Nagkanda, Simla, 8,000 feet	...
H 3023.	" " 9,000 "	59

4. FRAXINUS, Tournef.

Contains 3 Indian species found in the North-West Himalaya. *F. excelsior*, Linn.; Brandis 303. Vern. *Súm, kúm*, Pb. The Ash, is found in the valleys of the Jhelum, Chenab and Ravi between 4,000 and 6,000 feet. *F. Moorcroftiana*, Wall.; Brandis 304. Vern. *Shang*, Afg.; *Hanúz, núch, shilli, chúj, siju, chúm, thúm, sandal, shangal, butru*, Pb.; *Auga, gaha*, North-Western Provinces, is a large shrub or small tree of Afghanistan, the Trans-Indus and the North-West Himalaya from the Jhelum to Kumaun. It is often gregarious, has a slow growth (20 rings per inch of radius) and a light-brown, heavy, hard, close-grained wood which is used for tool handles and makes good fuel.

Wood moderately hard, white in some species; with a brown heartwood. Pores large and numerous in the spring wood; small, scanty and often arranged in groups in the autumn wood. Medullary rays fine, uniform, equidistant. In *F. floribunda, excelsior,* and other species the wood consists of alternate layers of soft porous spring wood, and hard, compact, autumn wood.

1. F. floribunda, Wall.; Brandis 302. Vern. *Banárish*, Afg.; *Súm, súnnu, shún, húm, hamu, túnnú,* Pb.; *Angan, angu, dakkúri,* North-Western Provinces; *Kangu, tahási,* Nep.

ctum, Hook. f. and Th.; Brandis 310.

) Bark grey, $\frac{1}{12}$ inch thick. Wood white, moderately ings marked by a narrow porous belt. Pores small in l, extremely small in the autumn wood. Medullary rays ine, numerous.

Himalaya from the Beas to the Sarda, at 3 500 to 6,000 feet , 17 rings per inch of radius Weight, 64 lbs. per cubic foot.

	lbs.
oti, Simla, 6,000 feet . .	64

8. LINOCIERA, Swartz.

at 6 species *L intermedia*, Wight (*Chionanthus intermedia*,) and *L malabarica*, Wall (*C malabarica*, Beddome chr) are large rn Ghats, while Kurz under *Chionanthus* describes 4 species from Andamans

s *L macrophylla* . . . .
the Saharanpur Gar . . .
ts s ranged n . . .
res.

VIII. SALVADORACEÆ.

lora and *Azima* *Azima tetracantha*, Lamk ; Kurz thorny shrub of South India and Burma It is very rk are used in native medicine as an expectorant

SALVADORA, Linn.

xb Fl. Ind i. 389, Brandis 315 *S Wighti*- ooth-brush Tree. Vern *Arák*, *iral*, Arab ; ; *Jhál*, Rajputana, *Kauri ián*, *kauri-jal*, Tam., *Waragu-wenki*, *ghunia*, Tel.; *Pílu*,

, with thin grey bark. Wood white, soft. lines, but enclosed in oval patches of soft tissue bands of soft tissue, separating broader bands he fine and numerous medullary rays are dis-

Guzerat, Konkan and the Circars.
ll, but in favourable circumstances attains 30 to 40 crooked and fluted, 8 10 feet long and 4 5 feet in girth. as 14 feet 9 inches in girth Weight, 40 5 lbs. specimen gives 38 lbs It is very little used and gs are used as tooth cleaners, the root bark is very a blister, the shoots and leaves are pungent, but ison, they are eaten as salad and given as fodder bitter and aromatic, and is used medicinally.

	bs.
. . . . . .	38

Medullary rays fine, numerous, uniform and at equal distances, conspicuous on a radial section as narrow plates.

Kumaun, Burma, Central and South India.

Weight, 56 lbs. per cubic foot; Brandis says 50 lbs. The wood is durable, works freely and does not warp or split. It is used for combs, weavers' beams and turning.

			lbs.
C	829.	Bairagarh Reserve, Berar	59
C	2772.	Melghát, Berar	...
C	193.	Mandla, Central Provinces (1870)	51
C	1108.	Ahiri Reserve, Central Provinces	...
C	1410.	Moharli "	...
B	1413.	Burma	
B	3149.	" (1862)	

GA,

Contains 2 specie
a glabrous shrub fou n.; B
cultivated in the P wart
in European gar r. *S.* u

1. S. E y c

banchír, ra ra
chilangha *ú*

A la u
with a

1. L. compactum, Hook. f. and Th; Brandis 310.

A large shrub. Bark grey, $\frac{1}{12}$ inch thick Wood white, moderately hard Annual rings marked by a narrow porous belt. Pores small in the spring wood, extremely small in the autumn wood Medullary rays fine and very fine, numerous.

North West Himalaya from the Beas to the Sarda at 3 500 to 6 000 feet Growth slow, 17 rings per inch of radius Weight, 64 lbs per cubic foot

		lbs
H 3059	Koti, Simla, 6,000 feet	64

8. LINOCIERA, Swartz.

Contains about 6 species *L intermedia*, Wight (*Chionanthus intermedia*, Beddome t 239) and *L malabarica*, Wall (*C malabarica*, Beddome cliv) are large trees of the Western Ghâts, while Kurz under *Chionanthus* describes 4 species from Burma and the Andamans

No 3211 is *L macrophylla* ... cultivated tree in the Saharanpur Gar... white wood, pores small, arranged i... bent where they touch the pores

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ORDER LXVIII SALVADORACEÆ.

Contains 2 genera *Salvadora* and *Azima* *Azima tetracantha*, Lamk, Kurz ii 161, is a straggling, diœcious thorny shrub of South India and Burma It is very common and the leaves and bark are used in native medicine as an expectorant (Wight Ill t 152, p 156)

1. SALVADORA, Linn.

1. S. persica, Linn, Roxb Fl Ind i 389, Brandis 315 *S Wightiana*, Beddome t 247. The Tooth-brush Tree Vern *Arak*, *irak*, Arab, *Kabbar*, *khandjar*, *pilu*, Sind, *Jhál*, Rajputana, *Kauri ián*, *kauri jal*, *jhái*, *jhit*, Pb, *Opa*, *ughai*, Tam, *Waragu-wenki*, *ghunia*, Tel, *Pílu*, Mar.

A small evergreen tree, with thin grey bark Wood white, soft Pores small, in short radial lines, but enclosed in oval patches of soft tissue Numerous fine concentric bands of soft tissue, separating broader bands of firm texture, in which the fine and numerous medullary rays are distinctly visible

Wild in Sind, Rajputana, Guzerat, Konkan and the Circars

The tree is generally small ... feet, with a short trunk, ... Specimens have been see... (Dalzell), 46 lbs (Fenne... is not even a good fuel The twigs are used as tooth cleaners, the root bark is very acrid and acts on the skin like a blister, the shoots and leaves are pungent, but are considered as an antidote to poison they are eaten as salad and given as fodder to camels, the fruit also is pungent, bitter and aromatic, and is used medicinally.

		lbs
P 1381	Sind	38

1. O. ferruginea, Royle; Brandis 576. *O. cuspidata,* Wall.; Brandis 307. Vern. *Khwan, shwan,* Trans.-Indus; *Zaitún,* Afg.; *Ko, kohú, káo, kau,* Pb.; *Kau,* Hind.; *Khau,* Sind.

A moderate-sized deciduous tree. Bark grey, thin, smooth when young, when old exfoliating in large narrow strips. Sapwood whitish; heartwood large, regularly shaped, from light brown or olive brown to nearly black, smooth, extremely hard. Annual rings distinctly marked by a belt of closely-packed pores. Pores in the rest of the annual ring extremely small, in irregular patches of soft tissue. Medullary rays fine, uniform, very numerous, equidistant.

Sind; Suliman Range, Salt Range, North-West Himalaya, extending as far as the Jumna eastwards, and ascending to 6,000 feet.

Weight, 65 to 82 lbs. per cubic foot, averaging 73 lbs. Brandis says that Sind wood weighs 65 lbs., but his specimen from the Sind hills reaches 82 lbs. The wood polishes well and is highly prized for turning, for combs, agricultural implements and fuel. The fruit is eaten, but is rarely found on the trees owing to the fondness of crows for it. Oil has been extracted from it, but only in small quantity though of good quality. The wood is worth trying as a substitute for boxwood or for the wood of the European olive and for inlaying work, as it is often prettily marbled.

			lbs.
H	162.	Shahpur (Stewart, 1866)	65
H	118.	Vaziri-Rupi, 4,000 feet	73
H	779.	Chamba, 3,500 feet	71
H	425.	Koti Forest, Jaunsar, 6,000 feet	75
P	2729.	Hills of Sind	82

2. O. glandulifera, Wall.: Beddome t. 238; Brandis 309. *O. paniculata,* Roxb. Fl. Ind. i. 105, not *paniculata,* R. Brown (an Australian species). Vern. *Gúlíli, raban, síra, phalsh,* Pb.; *Gair, galdu, garúr,* Kumaun.

A moderate-sized tree. Bark ⅓ inch thick, grey, uneven, exfoliating in brittle scales. Wood reddish grey, hard. Annual rings marked by a distinct line. Pores moderate-sized, oval, subdivided, uniformly distributed. Medullary rays fine, numerous, prominent on a radial section.

Outer Himalaya from the Indus to Nepal, between 2,500 and 6,000 feet. Nilgiris and Anamalai Hills in South India.

A section of a tree 43 years old, in the Botanic Gardens, Calcutta, shewed 43 rings on a radius of 10 inches (*Brandis*); this would give 4·3 rings per inch or fast growth: our specimens give 12 to 33 rings per inch of radius. Weight, on an average, 54·5 lbs. per cubic foot. The wood is durable, takes a good polish and is not liable to be eaten

Linn.; Brandis 303. Vern..
Jhelum, Chenab and Ravi
Brandis 304. Vern. *Shang,* Af
shangal, butru, Pb.; *Auga, ga*
tree of Afghanistan, the Trans-I
to Kumaun. It is often gregario
and a light-brown, heavy, hard, clos
makes good fuel.

	lbs.
...00 feet	59
...3,000 feet	55
(1868)	50

...GUSTRUM, Linn.

Wood moderately hard, white
wood. Pores large and numerous
often arranged in groups in the
uniform, equidistant. In *F. floribu*
wood consists of alternate layers
compact, autumn wood.

...rubs or small trees. *L. robustum,* Hook. f. and ...amble 54 (*Phillyrea robusta,* Roxb. Fl. Ind. i. ...n. *Keri, banpatara,* Hind.; *Jamu,* Nep., is a Kumaun eastwards, Bengal, Southern India and ...epalense, Wall.; Roxb. Fl. Ind. i. 149; Brandis ...ceolatum, Don; Brandis 310, are small trees ...Beddome cliv., is a shrub of Coorg. The

1. F. floribunda, Wall.; Brandis ...
súnnu, shún, húm, hamu, túnnú, Pb.;
Western Provinces; *Kangu, tahási,* Nep.

1 L compactum, Hook f and Th, Brandis 310
A large shrub Bark grey, $\frac{1}{12}$ inch thick Wood white, moderately hard Annual rings marked by a narrow porous belt Pores small in the spring wood, extremely small in the autumn wood Medullary rays fine and very fine, numerous

North West Himalaya from the Beas to the Sarda at 3 500 to 6 000 feet
Growth slow 17 rings per inch of radius Weight 64 lbs per cubic foot

		lbs
H 3059	Koti, Simla 6 000 feet	64

8 LINOCIERA, Swartz

Contains about 6 species *L intermedia* Wight (*Chionanthus intermedia* Beddome t 239) and *L malabarica* Wall (*C malabarica* Beddome clv) are large trees of the Western Ghats while Kurz under *Chionanthus* describes 4 species from Burma and the Andamans

bent where they touch the pores

ORDER LXVIII SALVADORACEÆ

Contains 2 genera *Salvadora* and *Azima* *Azima tetracantha* Lamk Kurz ii 161 is a straggling diœcious thorny shrub of South India and Burma It is very common and the leaves and bark are used in native medicine as an expectorant (Wight Ill t. 152 p 156)

1. SALVADORA, Linn

1 S persica, Linn, Roxb Fl Ind i 389, Brandis 315 *S Wightiana*, Beddome t 247 The Tooth brush Tree Vern *Arak, irak* Arab, *Kabbar, kharidjar, pilu*, Sind, *Jhal*, Rajputana, *Kauri ian, kauri jal, jhar, jhit*, Pb, *Opa, ughai*, Tam, *Waragu wenki, ghunia*, Tel, *Pilu*, Mar
A small evergreen tree, with thin grey bark Wood white, soft

tinctly visible

nces attains 30 to 40 feet and 4 5 feet in girth Spec rth Weight 40 5 lbs (Dalzell) 46 lbs (Fenner) our specimen gives 38 lbs It is very little used and very but dder

		lbs
P 1381	Sind	38

2. S. oleoides, Linn.; Brandis 316. Vern. *Kabbar, jhár, diár, mithi-diár*, Sind; *Jál, váa, váni, mithi van*, Pb.; *Jhal*, Hind.; *Ughai, koku*, Tam.; *Pílu*, Mar.

A large evergreen shrub or tree. Bark ¼ inch thick, whitish grey, tesselated. Wood light red, moderately hard, with small, irregular, purple heartwood. Pores large and small, oval, often subdivided into irregular patches of soft tissue, which are joined by wavy, irregular zigzag bands. Medullary rays fine, numerous, distinct, at unequal distances.

Arid zone. Sind and Punjab, often forming the greater part of the vegetation of the desert; ascends to 3,000 feet in the Trans-Indus hills and to 2,400 feet in the Salt Range.

Weight, 49 lbs. (Brandis); our specimens give 54 lbs. (Punjab) and 38 lbs. (Sind). Wood sometimes used for building and agricultural implements, Persian wheels and the knee timbers of boats. Is a bad fuel and leaves a great deal of ash. The fruit is sweet and is eaten.

		lbs.
P 912.	Multán (with heartwood)	54
P 1382.	Sind (no heartwood)	38

Order LXIX. APOCYNEÆ.

A large Order containing 33 genera, only a few of which are of any importance. They belong to 3 Tribes, *viz.*—

Tribe I.—Carisseæ	*Allamanda, Willoughbeia, Chilocarpus, Melodinus, Winchia* and *Carissa*.
„ II.—Plumerieæ	*Rauwolfia, Alyxia, Hunteria, Thevetia, Cerbera, Ochrosia, Kopsia, Rhazya, Vinca, Plumeria, Ellertonia, Alstonia, Tabernæmontana* and *Holarrhena*.
„ III.—Echitideæ	*Vallaris, Parsonsia, Pottsia, Wrightia, Nerium, Strophanthus, Parameria, Urceola, Ichnocarpus, Epigynum, Anodendron, Chonemorpha* and *Beaumontia*.

Among these genera, however, four contain only introduced plants. *Allamanda cathartica*, Linn.; Kurz ii. 164, is a large yellow-flowered shrub from America, much cultivated in India and run wild in tidal backwaters of the Western Coast (*Beddome*). *Thevetia neriifolia*, Juss.; Kurz ii. 168. Vern. *Zard kunél*, Hind.; *Hpayoungban*, Burm., is a handsome yellow-flowered small tree, much cultivated in Bengal and Burma. It has long narrow leaves and a hemispherical drupe, from the seeds of which a bright yellow oil can be obtained. *Vinca rosea*, Linn., the Madagascar Periwinkle, is a small pink-flowered shrub commonly planted in India and Burma. *Plumeria acutifolia*, Poiret; Brandis 323; Kurz ii. 179; Gamble 55. Vern. *Gul achin, golainchi, chameli*, Hind.; *Khair champa*, Bombay; *Champa pungár*, Gondi; *Kanagala*, Kan.; *Tayopsagah*, Burm., is a gouty-branched tree with large, yellowish white, fragrant flowers, commonly found in gardens in India and Burma. Van Someren calls it the "Pagoda tree."

Seventeen other genera contain only climbing shrubs. *Willoughbeia* contains 2 species. *W. edulis*, Roxb. Fl. Ind. ii. 57; Kurz ii. 165. Vern. *Luti-am*, Beng., is a large climber of Chittagong with edible fruit. It yields a kind of caoutchouc, as does also *W. martabanica*, Wall.; Kurz ii. 165. Vern. *Thit kyouknway*, Burm., of Tenasserim.

yield a superior kind of caoutchouc (to this genus also belongs *U. elastica*, Roxb., ... *Chilocarpus, Melodinus,* ... *Pottsia, Strophanthus,* ... *gynum*, and *Anodendron*,

... cisne, Brandis 322. Vern *Vena*, Salt Range, *Gandera*, Trans Indus, *Sewar, sihar, ishwarg*, Sind, is a shrub of the arid zone of the Punjab, Sind and Afghanistan, its wood is used for fuel, and the fruit and leaves in native medicine.

Wood white, soft (hard in *Carissa*), without heartwood. Pores small or very small. Medullary rays very fine, very numerous. *Alstonia* is anomalous in having moderate-sized pores, distant rays and concentric lines of soft texture.

1. CARISSA, Linn.

1. C. diffusa, Roxb. Fl. Ind. i. 689, Beddome clvii., Brandis 321; Kurz ii. 169. Vern. *Karaunda*, Hind.; *Gán, garna, garinda*, Pb.; *San karunda*, Uriya; *Wakoilu*, Tel.

A small, thorny, evergreen shrub, with light grey bark. Wood hard, smooth, close-grained, said when very old (in Kangra) to be black and fragrant (Brandis). Annual rings marked by an interrupted line of pores. Pores very small and extremely small. Medullary rays very fine, very numerous.

Wild in most parts of India, especially in the drier zones as in the plains of the Punjab, the Sub-Himalayan tract up to 4,000 feet, and in Trans-Indus territory, ... on the coast of South Andaman (Kurz). ... often forming undergrowth in forests of *Pinus* ... ally teak. It spreads rapidly in clearings, coppices ... It is used for turning and combs, and to make dry fences. Growth slow, 16 rings per inch of radius.

P. 112. Bhajji, Simla, 4,000 feet.

2. **S. oleoides**, Linn.; Brandis 316. Vern. *Kabbar, jhár, diár, mithidiár*, Sind; *Jál, ván, váni, mithi van*, Pb.; *Jhal*, Hind.; *Ughai, koku*, Tam.; *Pilu*, Mar.

A large evergreen shrub or tree. Bark ¼ inch thick, whitish grey, tesselated. Wood light red, moderately hard, with small, irregular, purple heartwood. Pores large and small, oval, often subdivided into irregular patches of soft tissue, which are joined by wavy, irregular zigzag bands. Medullary rays fine, numerous, distinct, at unequal distances.

Arid zone. Sind and Punjab, often forming the greater part of the vegetation of the desert; ascends to 3,000 feet in the Trans-Indus hills and to 2,400 feet in the Salt Range.

Weight, 49 lbs. (Brandis); our specimens give 51 lbs. (Punjab) and 38 lbs. (Sind). Wood sometimes used for building and agricultural implements, Persian wheels and the knee timbers of boats. Is a bad fuel and leaves a great deal of ash. The fruit is sweet and is eaten.

		lbs.
P 912.	Multán (with heartwood)	51
P 1382.	Sind (no heartwood)	38

ORDER LXIX. APOCYNEÆ.

A large Order containing 33 genera, only a few of which are of any importance. They belong to 3 Tribes, *viz.*—

Tribe I.—Carisseæ	*Allamanda, Willoughbeia, Chilocarpus, Melodinus, Winchia* and *Carissa*.
„ II.—Plumerieæ	*Rauwolfia, Alyxia, Hunteria, Thevetia, Cerbera, Ochrosia, Kopsia, Rhazya, Vinca, Plumeria, Ellertonia, Alstonia, Tabernæmontana* and *Holarrhena*.
„ III.—Echitideæ	*Vallaris, Parsonsia, Pottsia, Wrightia, Nerium, Strophanthus, Parameria, Urceola, Ichnocarpus, Epigynum, Anodendron, Chonemorpha* and *Beaumontia*.

Among these genera, however, four contain only introduced plants. *Allamanda cathartica*, Linn.; Kurz ii. 164, is a large yellow-flowered shrub from America, much cultivated in India and run wild in tidal backwaters of the Western Coast (*Beddome*). *Thevetia neriifolia*, Juss.; Kurz ii. 168. Vern. *Zard kunél*, Hind.; *Hpayoungban*, Burm., is a handsome yellow-flowered small tree, much cultivated in Bengal and Burma. It has long narrow leaves and a hemispherical drupe, from the seeds of which a bright yellow oil can be obtained. *Vinca rosea*, Linn., the Madagascar Periwinkle, is a small pink-flowered shrub commonly planted in India and Burma. *Plumeria acutifolia*, Poiret; Brandis 323; Kurz ii. 179; Gamble 55. Vern. *Gul achin, golainchi, chameli*, Hind.; *Khair champa*, Bombay; *Champa pungár*, Gondi; *Kanagala*, Kan.; *Tayopsagah*, Burm., is a gouty-branched tree with large, yellowish white, fragrant flowers, commonly found in gardens in India and Burma. Van Someren calls it the "Pagoda tree."

Seventeen other genera contain only climbing shrubs. *Willoughbeia* contains 2 species. *W. edulis*, Roxb. Fl. Ind. ii. 57; Kurz ii. 165. Vern. *Luti-am*, Beng., is a large climber of Chittagong with edible fruit. It yields a kind of caoutchouc, as does also *W. martabanica*, Wall.; Kurz ii. 165. Vern. *Thit kyouknway*, Burm., of Tenasserim.

yield a superior kind of caoutchouc (to this genus also belongs U elastica Roxb,

caisne, Brandis 3.. Vern Fena, Salt Range, Ganaera Trans Indus Sewar, sihar ishwarq, Sind is a shrub of the arid zone of the Punjab Sind and Afghanistan, its wood is used for fuel, and the fruit and leaves in native medicine

Wood white, soft (hard in *Carissa*), without heartwood Pores small or very small Medullary rays very fine, very numerous *Alstonia* is anomalous in having moderate sized pores, distant rays and concentric lines of soft texture

1 CARISSA, Linn

1 C diffusa, Roxb Fl Ind i 689, Beddome clvii, Brandis 321, Kurz ii 169 Vern *Karaunda*, Hind, *Gan, garna, garinda*, Pb, *San karunda*, Uriya, *Wakoilu*, Tel

A small, thorny, evergreen shrub, with light grey bark Wood hard, smooth, close-grained, said when very old (in Kangra) to be black and fragrant (Brandis) Annual rings marked by an interrupted line of pores Pores very small and extremely small Medullary rays very fine, very numerous

Wild in most parts of India especially in the drier zones as in the plains of the Punjab the Sub Himalayan tract up to 4 000 feet, and in Trans Indus territory, ... in (Kurz) ... often forming undergrowth in forests of *Pinus* ... ally teak It spreads rapidly in clearings, coppices ... It is used for turning and combs and to fences Growth slow, 10 rings per inch of radius

P 112 Bilaspi Simla 4 000 feet

dry and 343 lbs. when wet, while common hemp only withstood 158 and 190 lbs. Royle says that a rope (1½ inch) broke with 903 lbs., strong European rope breaking with 1,203 lbs. *M. Roylei*, Wight; Brandis 333. Vern. *Pathor*, Chenab; *Tar, veri*, Salt Range; *Kurang*, Simla (H 3194. Naldehra, Simla, 6,000 feet, with a white porous wood and annual rings marked by large pores), and *M. lucida*, Edgew.; Brandis 333. Vern. *Dudhi*, Kumaun, are small climbers of the North-West Himalaya. *Pergularia* contains 2 species: *P. pallida*, W. and A.; Brandis 334; Kurz ii. 202. Vern. *Surkila*, Kumaun, of Northern India; and *P. odoratissima*, Linn.; Brandis 334; Kurz ii. 203; Gamble 56. Vern. *Kanja lúta, kunjalt*, Beng.; *Simpletbuk*, Lepcha, of Bengal, Burma and the North-West Himalaya as far as the Jumna, often cultivated.

Leptadenia viminea; Bth. and Hook. f. (*Orthanthera viminea*, Wight; Brandis 335) Vern. *Mowa, lancbár*, Trans-Indus; *Matti*, Beas; *Khip*, Delhi; *Kip*, Sind; *Chapkia*, Kumaun; *Mahúr*, Hind., is a glabrous shrub of the arid and northern dry region from Sind to Oudh. The flower-buds are eaten as a vegetable, and a rope is made of the fibre. *Hemidesmus indicus*, R. Br. (*Asclepias Pseudo-sarsa*, Roxb. Fl. Ind. ii. 39,) Vern. *Anantamul*, Beng., is a climber whose roots are used as a substitute for sarsaparilla. There are also numerous small climbers of other genera found in the Indian forests, but none sufficiently large to be worth mention.

Order LXXI. LOGANIACEÆ.

Contains 4 Indian genera, *Buddleia*, *Fagræa*, *Strychnos* and *Gardneria*. *Gaertnera*, Beddome clxiv, contains only Ceylon plants. *Gardneria ovata*, Wall.; Kurz ii. 227; Gamble 57. Vern. *Banjahi*, Kumaun; *Takpadik*, Lepcha, is a climber of the North-East Himalaya and Eastern Bengal. Kurz has divided this Order among several neighbouring ones, placing *Strychnos* in Apocyneæ; *Fagræa* in Gentianeæ; *Buddleia* in Pedalineæ; and *Gardneria* in Solaneæ; we have, however, considered it better to follow Bentham and Hooker, and retain the Order, although the diverse structure of the wood of the different genera would seem to accord with Kurz's views.

The structure of *Strychnos* and *Fagræa* is similar in having scattered, large, ramified pores (intercellular ducts?) and small pores in concentric bands or irregular patches; and very sharply marked medullary rays in the firmer tissue intervening between the irregular patches. The structure of *Buddleia* is altogether different.

1. BUDDLEIA, Linn.

Contains 4 or 5 species. *B. macrostachya*, Bth., is a shrub of the Himalaya from Simla eastwards, the Khasia Hills and Sylhet.

Wood soft or moderately hard, no heartwood. Annual rings distinctly marked by a belt of numerous pores, the pores in the outer wood being s... often arranged in groups or concentric lines.

...ome clxiii; Brandis 318; Kurz ii. 250;
...Fl. Ind. i. 396. Vern. *Bhati, dhaula*,
... *Newarpati*, Nep.; *Pondám*, Lepcha;
...*gmee koo*, ...
... grey, moderately
...by ... ...sely-packed pores
... scanty except

...,000 ft., Bengal,
village sites and

Growth fast, 4½ rings per inch of radius Weight, 44 lbs per cubic foot It has white, long, tomentose leaves and long spikes of fragrant white flowers It is very ornamental and is often grown in gardens

		lbs
H 110	Sutlej Valley, Simla, 4,000 feet	44

2. B. paniculata, Wall ; Brandis 318, Kurz ii 251, Gamble 56 *B. crispa*, Bth Vern *Spera wuna*, Afg, *Bhollu, ghúttia, sodhera, sudhari*, North-Western Himalaya, *Sinna*, Nep.

A large evergreen shrub. Bark thin, light grey, peeling off in long strips Wood white, moderately hard, close-grained Annual rings marked by a belt of small pores Pores in the autumn wood very small, in groups and in oblique lines Medullary rays fine

Himalaya, from the Indus to Bhutan ascending to 7,000 ft
Growth moderate, 11 rings per inch of radius Weight, 41 lbs per cubic foot

		lbs
H 158	Simla, 7,000 ft	41
H 2882	Nagkanda, Simla, 7,000 feet	

3. B. Colvillei, Hook f and Th, Gamble 56 Vern *Puri singbatti*, Nep., *Pya-shing*, Bhutan

A small tree Wood reddish brown, soft. Pores of two sizes large near the annual rings, smaller in the autumn wood, these latter grouped, the groups being enclosed in patches of soft tissue, which are arranged in interrupted concentric bands Medullary rays fine

[illegible] 9,000 to 12,000 feet
per cubic foot An
[illegible] hich appear in August
of Mount Tonglo

		lbs.
E 2393	Tonglo, Darjeeling, 10 000 feet	35

2 FAGRÆA, Thunb

Contains about 6 species *F coromandelina* Wight, Beddome t 244 Vern *Ginnuna* Kan is a small handsome flowered tree of the Eastern Ghats of South India *F auricularia*, Jack and *F carnosa*, Jack, Kurz ii 204, are large shrubs of Tenasserim

1. F. fragrans, Roxb Fl Ind i 461, Kurz ii 205 Vern *Anan*, Burm

An evergreen tree Wood hard, brown, close-grained, beautifully mottled Pores of two classes, large ones scanty, often subdivided, small ones in narrow, wavy, concentric bands, which alternate with broader bands of firm and dark-coloured tissue in which the numerous fine medullary rays are distinctly visible The large pores (vessels or intercellular ducts) are prominent on a vertical section

Burma
Weight according to Baker 70 lbs, Wallich 52 5 lbs, Simpson, 57 lbs., Major Seaton 60 lbs, our specimens vary from 53 to 65 lbs Baker s four experiments with Tavoy wood with bars 7 × 2′ × 2 gave P = 553, Simpson s gave 387, but the wood was a bad specimen The wood is very durable and is not liable to the attacks of Teredo It is one of the most important of the reserved trees of Burma

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Wood soft or moderately hard, no heartwood. Annual rings distinctly marked by a belt of numerous porès, the pores in the outer wood being smaller and often arranged in groups or concentric lines.

1. B. asiatica, Lour.; Beddome clxiii; Brandis 318; Kurz ii. 250; Gamble 56. *B. Neemda*, Roxb. Fl. Ind. i. 396. Vern. *Bhati, dhaula, shiúntra*, Kumaun; *Bana*, Simla; *Newarpati*, Nep.; *Pondám*, Lepcha; *Nimda, budhbola*, Chittagong; *Kyoungmee koo*, Burm.

A large evergreen shrub. Bark thin, grey. Wood grey, moderately hard. Annual rings distinctly marked by a belt of closely-packed pores in the spring wood. Pores small, not all of equal size, scanty except along the annual rings. Medullary rays fine, numerous.

Sub-Himalayan tract from the Indus eastwards, ascending to 4,000 ft., Bengal, Burma, South India; chiefly found in second growth forests, deserted village sites and savannahs.

Growth fast 4½ rings per inch of radius Weight 44 lbs per cubic foot It has white, long tomentose leaves and long spikes of fragrant white flowers It is very ornamental and is often grown in gardens

		lbs
H 110	Sutlej Valley, Simla, 4 000 feet	44

2. B. paniculata, Wall , Brandis 318 , Kurz ii 251 , Gamble 56 *B. crispa*, Bth Vern *Spera wuna*, Afg , *Dholtu, ghúttia, sodhera, sudhari*, North-Western Himalaya , *Sinna*, Nep

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Himalaya, from the Indus to Bhutan ascending to 7 000 ft
Growth moderate, 11 rings per inch of radius Weight, 41 lbs per cubic foot

		lbs
H 158	Simla 7 000 ft	41
H 2882	Nagkanda, Simla, 7,000 feet	

3 B. Colvillei, Hook f and Th , Gamble 56 Vern *Puri singbatti*, Nep , *Pya-shing*, Bhutia

A small tree Wood reddish brown, soft Pores of two sizes large near the annual rings, smaller in the autumn wood, these latter grouped, the groups being enclosed in patches of soft tissue, which are arranged in interrupted concentric bands Medullary rays fine

Eastern Himalaya 9 000 to 12 000 feet
Growth slow, 13 rings per inch of radius Weight 35 lbs per cubic foot An extremely handsome tree with masses of dark crimson flowers, which appear in August and make the tree very conspicuous in its habitat on the summit of Mount Tonglo

		lbs
E 2393	Tonglo, Darjeeling 10 000 feet	35

2 FAGRÆA, Thunb

Contains about 6 ... ern
Gunnuna Kan is a ... uth
India *F auriculari*... of
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1. F. fragrans, Roxb Fl Ind i 461, Kurz ii 205 Vern *Anan*, Burm

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especially in Tavoy; and is used for house-building, bridge and wharf piles, boat-anchors and other purposes.

			lbs.
B	289.	Burma (1867)	53
B	550.	Martaban	65
B	3073.	Burma (1862)	57

2. F. racemosa, Jack; Kurz ii. 205. Vern. *Thit-hpaloo*, Burm.

A moderate-sized evergreen tree. Wood moderately hard, greasy to the touch and with a scent like that of India-rubber. Pores of two sizes: moderate-sized pores scattered, often oval and subdivided, and extremely small pores in narrow, wavy, concentric bands, alternating with broader bands of firmer tissue, in which the fine, numerous medullary rays are distinctly visible.

Andaman Islands.

Weight, 50 lbs. per cubic foot. Major Ford says it is strong and durable, that the wood is used for house-posts, and the root bark as a cure for fever.

			lbs.
B	1990.	Andamans (Kurz, 1866)	52
B	2294.	" (Ford, 1866)	48

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3. E 1450. (56 lbs) brought by Dr. Griffith from the Mishmi Hills in 1836, has the structure of *Fagræa*. It is probably *F. obovata*, Wall.; Beddome clxiv; Kurz ii. 205; Gamble 56. Vern. *Sunakhari*, Nep.; *Longsoma*, Magh; *Nvoungkyap*, Burman evergreen tree, often scandent or stem clasping, found in the forests of Northern and Eastern Bengal, Chittagong and Burma.

3. STRYCHNOS, Linn.

Contains 6 to 8 species of Indian trees or climbing shrubs. *S. Wallichiana*, Steud.; Kurz ii. 167, is an evergreen tree of the forests of the Pegu Yomah. *S. cinnamomifolia*, Thw. and *S. colubrina*, Linn.; Beddome clxiii are gigantic climbers of the Western Ghâts, while *S. laurina*, Wall. and *S. acuminata*, Wall.; Kurz ii. 166, are large evergreen climbers of Tenasserim, the latter also occurring on the coasts of South Andaman.

1. S. potatorum, Linn. fil.; Roxb. Fl. Ind. i. 576; Beddome clxiii; Brandis 317; Kurz ii. 167. The Clearing Nut Tree. Vern. *Nirmali, nel mal*, Hind.; *Kotaku*, Uriya; *Ustumri*, Gondi; *Tettancottai, tettian*, Tam.; *Chilla, indupa, induga, katakamu, judapa*, Tel.; *Nirmali, chilbinj*, Mar.; *Ustumri*, Gondi; *Tettam-parel*, Mal.; *Chiltu*, Kan.; *Ingini*, Cingh.

A moderate-sized evergreen tree. Bark $\frac{1}{10}$th inch thick, greyish brown and sometimes almost black, with numerous small angular, exfoliating scales. Wood white when fresh cut, turning yellowish grey on exposure, hard, close-grained, seasons well. No heartwood, no annual rings. Pores of two classes: large pores scanty, very small pores numerous, arranged in irregularly ramified patches, which are extremely variable in shape, giving the wood a remarkably fantastic pattern on a cross section. These patches are joined by white concentric lines which may possibly be annual rings. Medullary rays white, fine and moderately broad, numerous, sharply defined in the darker tissue. The large pores, which are prominent on a radial section, are filled with a white shining substance and are often ramified. They are probably not vessels, but large intercellular ducts.

Bengal, Central and South India

Weight, 57 lbs per cubic foot Wood durable, used for building, carts and agricultural implements The pulp of the fruit is eaten, and the ripe seeds are used to clear muddy water by merely rubbing the inside of the jar with the seed

		lbs
C 1101	Ahiri Reserve Central Provinces .	55
C 2979	Bijeragogarh, Central Provinces .	
D 1060	South Arcot .	61
No 41	Salem Collection .	56

2. S. Nux-vomica, Linn , Roxb Fl Ind i 575, Beddome t 243; Brandis 317, Kurz ii. 166. The Sn[illegible] W[illegible] N[illegible] Tree Vern. *Kuchla, Kajra,* Hind ; [illegible] *Yetti,* Tam.; *Mushti, musadi,* Tel ; [illegible] *gadde,* Kan , *Kara, jhar katchura,* Mar , *Kanjaram,* Travancore; *Goda kaduru,* Cingh ; *Khaboung,* Burm.

A moderate-sized evergreen tree, with dark grey bark Wood brownish grey, hard, close-grained, splits and warps Pores of two classes very large pores (intercellular ducts) scanty, filled with a white substance, very prominent on a vertical section, where they are often branching , and small pores in irregularly shaped, ramified patches, which are joined by concentric and oblique white lines Medullary rays fine and moderately broad, prominent in the firm, shining, hard tissue intervening between the patches above described

[illegible] ' experiments [illegible] eight 49 lbs , [illegible] ecimens give [illegible] implements, [illegible] ychnia mixed

		lbs
W 1224	North Kanara	65
W 727	South ,,	59
B 3072	Burma (1862)	49

ORDER LXXII BORAGINEÆ.

Contains 4 genera belonging to 3 tribes, *viz*,—

Tribe I —Cordieæ	*Cordia*
,, II —Ehretieæ . . .	*Ehretia* and *Rhabdia*
, III —Heliotropieæ .	*Tournefortia*

Rhabdia viminea Dalzell, Brandis 341 677, Kurz ii 211 is a small shrub of sandy and shingly river beds in Kumaun Bengal South India and Burma.

Tournefortia viridiflora, Wall , Gamble 57 Vern *Amvati* Nep [illegible]

[illegible] reaches to the size of a shrub, and may be used for hedges

Pores small or moderate-sized, the transverse diameter generally less than the distance between the rays, which are uniform and equidistant, generally short, either fine or moderately broad *Cordia* [illegible] bands of soft texture which are wanting in *Ehretia*

1. CORDIA, Linn.

Contains 13 Indian species. *C. Wallichii*, G. Don; Beddome t. 245. Vern. *Chandle*, Kan., is a tree of the Western Ghâts, Mysore and Bombay, with woolly leaves. *C. grandis*, Roxb.; Kurz ii. 208; Gamble 57; Roxb. Fl. Ind. i. 593. Vern. *Asári*, Nep.; *Thanat*, Burm.; is an evergreen tree of Northern and Eastern Bengal and Chittagong. *C. octandra*, DC.; Beddome clxvi. (*C. serrata*, Roxb. Fl. Ind. i. 591.) Vern. *Gadgondori*, Hind., is a small tree of Travancore. *C. monoica*, Roxb. Fl. Ind. i. 592; Beddome clxvi. Vern. *Pida*, Hind.; *Panugeri*, Tel., is a small poor-looking tree of the barren parts of the Circar forests. *C. polygama*, Roxb. Fl. Ind. i. 594; Beddome clxvi.; Kurz ii 207. Vern. *Bottukuru, patcha*, Tel., is a small tree of the mountains on the Coromandel Coast and the Eng forests of Martaban. *C. Perottetii*, DC.; and *C. fulvosa*, Wight, are small trees of the Western Ghâts. The above are white-flowered species. *C. subcordata*, Lamk.; Kurz ii. 209 (*C. campanulata*, Roxb. Fl. Ind. i. 593) is a handsome large shrub of the Andamans and Tenasserim, with red flowers, often cultivated. *C. speciosa*, Willd., and *C. tectonifolia*, Wall., are small trees with handsome scarlet flowers, cultivated in gardens, but introduced from the West Indies.

Numerous concentric lines of soft tissue, which sometimes are interrupted, but generally with the medullary rays divide the wood into oblongs or squares. Medullary rays prominent on a radial section.

1. **C. Myxa**, Linn.; Roxb. Fl. Ind. i. 590; Beddome clxv.; Brandis 336; Kurz ii. 208; Gamble 57. Vern. *Lasora, bhokar, gondi*, Hind.; *Laswara*, Pb.; *Lesúri, gidúri*, Sind; *Borla, baurala*, Kumaun; *Bohari, buhal*, Beng.; *Boeri*, Nep.; *Nimat*, Lepcha; *Dobakari*, Mechi; *Gondi*, Uriya; *Vidi, verasu*, Tam.; *Pedda boku, virgi, nakkera, irki, iriki*, Tel.; *Semar, goden, gondan*, Mar.; *Chotte*, Kan.; *Selte*, Gondi; *Silu*, Kurku; *Lasséri*, Baigas; *Lolú*, Cingh.; *Chaine*, Magh; *Thanat, toung thanat*, Burm.

A moderate-sized deciduous tree. Bark ½ to ¾ inch thick, grey or brown, rough with shallow longitudinal wrinkles and furrows. Wood grey, moderately hard. Pores of two sizes, a few moderate-sized or large, uniformly scattered and frequently double, the rest very small in narrow continuous concentric belts of soft tissue. Medullary rays alternately fine and broad, the rays with the white concentric lines dividing the wood into marked squares or oblong compartments. Medullary rays prominent on a radial section as rough horizontal plates, having a mottled appearance.

Salt Range, Sub-Himalayan tract from the Chenab to Assam ascending to 5,000 feet, Khasia Hills, Bengal, Burma, Central and South India.

Growth moderately fast, 3 to 9 rings per inch of radius (*Brandis*); our specimens do not shew the rings well, with the exception of two, which give 1 to 2 rings per inch, which must be called very fast. The weight is very variable. Brandis in Burma List of 1862, No. 82, gives 33 lbs. per cubic foot; our specimens vary from 23 to 42 lbs., but the average is 33 lbs. Brandis in For. Fl., p. 337, says 33 to 49 lbs. The wood, in spite of its softness, is fairly strong, and seasons well, but is readily attacked by insects. It is used for boat-building, well-curbs, gun-stocks and agricultural implements, in Bengal for canoes. It might be tried for tea-boxes. It is an excellent fuel. The bark is made into ropes and the fibre is used for caulking boats. The leaves are used as plates and in Pegu to cover Burmese cheroots. The fruit (*Sebestan*) is eaten, it is very mucilaginous and is used in native medicine. The viscid pulp is used as birdlime. The kernel is eaten and is used for marking linen, but the mark is fugacious.

			lbs.
O	250.	Garhwal (1868)	42
O	1376.	Gonda, Oudh	38
C	1149.	Ahiri Reserve, Central Provinces	37
E	642.	Rakti Forest, Darjeeling Terai	28

		lbs
E 2391	Bamunpokri, Darjeeling Terai	28
E 714	Chittagong	23
B 2543	Burma (1862)	36
No 42	Salem Collection (marked *Spondias mangifera*)	32

2 **C. Macleodii**, Hook f and Th , Brandis 337 Vern *Dhengan, dhaman, dhaian, dewan, dahi, dahipalas, dihgan*, Hind , *Dhaiwan*, Sattara, *Daiwas, dhaim, bholi*, Mar , *Bot*, Gondi, *Lauri kassamár*, Kurku, *Gadru*, Ajmere

A middling sized deciduous tree, with thick, grey, soft, corky bark Heartwood light brown, beautifully mottled with darker veins, even-grained, very hard, strong, tough and elastic, seasons well and works easily Pores small, in irregular concentric belts of white tissue, often joined by white lines without pores Medullary rays white, fine and moderately broad, prominent

cimens give 49 to 53 average 51 lbs and other ornamental work also for t deserves to be better known and more

in use

		lbs
P 3219	Nagpahar Ajmere	
C 180	Mandla Central Provinces (1870)	53
C 2985	Jubbulpore (1863)	50
C 831	Bairagarh Reserve Berar	49

3 **C. vestita**, Hook f and Th , Brandis 338 *Gynaion vestitum*, A DC Vern *Kumbi, karuk*, Pb , *Kum paiman, pín, indak, chinta, ajunta, bairula, berula*, Hind

A small deciduous tree Bark ½ inch thick, dark grey, exfoliating when old in large woody scales The wood has the same structure and appearance as that of *C Macleodii*, except that the concentric lines are occasionally interrupted

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		lbs
O 231	Garhwal (1868)	52
O 2998	(1874)	59
O 3232	Dehra Dún	

4 **C fragrantissima**, Kurz ii 207 Vern *Toungkalamet*, Burm

A deciduous tree Wood moderately hard, reddish brown with darker streaks, beautifully mottled, has a fragrant scent Pores small, in roundish patches, which are joined by fine, concentric lines Medullary rays short, moderately broad, distinctly marked on a vertical section

Burr
Weig
known.
to use

		lbs
B 285	Burma (1867)	48
B 1428	Tharrawaddy, Burma	51

5 **C. Rothii**, Rom and Schultes, Brandis 338 *C angustifolia*, Roxb Fl Ind i 595 Vern *Gondi, gondni, gundi*, Hind , Sind , *Narvilli*, Tam

A small tree. Bark grey or brownish grey, with deep longitudinal furrows. Wood grey, compact, hard. Pores small, often subdivided. Medullary rays fine and moderate-sized. Numerous fine bands of softer tissue which on a transverse section divide the wood between the medullary rays into small squares.

Dry zones of North-West and South India.

Growth moderate, 10 rings per inch of radius. Weight, 42 to 52 lbs. per cubic foot (*Brandis*); our specimen gives 46 lbs. Used for fuel, in Sind for building, and in Cutch for agricultural implements. The bark when wounded gives a gum, and the liber is made into ropes. The pulp of the fruit is eaten.

		lbs.
P 419.	Ajmere	46

2. EHRETIA, Linn.

Species about 8. *E. serrata*, Roxb. Fl. Ind. i. 596; Brandis 339; Kurz ii. 210; Gamble 57. Vern. *Pursan, kalthaun*, Pb.; *Púnyan, púnjlawái, panden, koda, kúrkúna, arjún*, Hind.; *Narra*, Garhwal; *Shaursi*, Kumaun; *Rend*, Kurku; *Ridi*, Baigas; *Nalshuna, chillay*, Nep.; *Bual*, Ass.; *Kala-aja*, Beng., is a tree of the Sub-Himalayan tract from the Indus to Bhutan ascending to 5,000 feet, Eastern Bengal, and Chittagong. Brandis says "the wood is light brown, with white specks, fairly even and compact, soft, not heavy, easily worked, made into scabbards, sword-hilts, gun-stocks, and employed for building and agricultural implements." Aikin in Wallich's List of 1831 gives 3·3 rings per inch of radius for the rate of growth. Kyd gives for the weight, 37 lbs. per cubic foot, and P = 530. The fruit is eaten. *E. aspera*, Roxb. Fl. Ind. i. 598; Beddome clxvi. Vern. *Tella júvi*, Tel., is a small bushy tree of dry barren places in South India; as is also *E. buxifolia*, Roxb. Fl. Ind. i. 598; Beddome clxvi. Vern. *Bapana-búri*, Tel. *E. ovalifolia*, Wight; Beddome clxvi., is a small tree of Coimbatore, Madura and Tinnevelly up to 2,000 feet, and *E. Wightiana*, Wall.; Beddome clxvi., a small tree of the Tinnevelly Gháts.

1. E. lævis, Roxb. Fl. Ind. i. 597; Beddome t. 246; Brandis 340; Kurz ii. 210. Vern. *Chamrúr, kóda, darar, datranga*, Hind.; *Tamboli*, Banda; *Mosonea*, Uriya; *Dotti, disti, gilchi*, Gondi; *Datranga*, Mar.; *Paldatam, redda pul-mera, seregad*, Tel.; *Kappura*, Kan.

A moderate-sized tree. Bark ⅓ inch thick, grey. Wood greyish white, hard. Annual rings indistinctly marked. Pores small, grouped in small clusters or radial lines. Medullary rays fine, short, numerous, distinctly visible on a radial section.

Suliman Range, Punjab, Sub-Himalayan tract, Oudh, Bengal, Burma and the Andaman Islands, Central and South India.

Growth moderate, 5 to 8 rings per inch of radius. Weight, 33 to 38 lbs. per cubic foot. Wood tough, durable, used for agricultural implements and building. The fruit is eaten, as is also the inner bark in times of famine.

		lbs.
O 257.	Garhwal (1868)	33
C 1155.	Ahiri Reserve, Central Provinces	38

2. E. obtusifolia, Hochstetter; Brandis 340.

A small shrub. Bark grey, thin. Wood resembling in structure that of *E. lævis*.

Salt Range in the Punjab, Sind and Rajputana.

P 3245. Ajmere.

3. E. Wallichiana, Hook. f. and Th.; Gamble 57. Vern. *Boeri, dowari*, Nep.; *Kalet*, Lepcha.

A large tree, sometimes gregarious. Wood grey, moderately hard. Annual rings marked by light-coloured belts. Pores small and moderate-

sized, in scattered groups and short radial lines Medullary rays short, fine, uniform, distinctly marked on a radial section

Darjeeling Forests from 2,000 to 7 000 feet.

Growth moderate, 7 rings per inch of radius Weight, 33 lbs per cubic foot The wood is used for building, for charcoal, and occasionally for making tea boxes

		lbs.
E 690	Sepoydura Forest, Darjeeling, 5 500 feet	33

Order LXXIII CONVOLVULACEÆ

Contains 7 genera of Indian shrubs or climbers, *viz*, *Erycibe*, *Rivea*, *Argyreia* ... all, Kurz ii 213 ... but of very littl ... well known "Elephant Creeper

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Order LXXIV SOLANEÆ.

An Order of no special forest interest, though of considerable economic importance producing the potato capsicum tomato, tobacco datura and Cape gooseberry It contains 2 genera of Indian shrubs or small trees, *Lycium* and *Solanum* *Lycium europæum*, Linn, Brandis 345 Vern *Ganger, kangu chirchitta, niral*, Pb, is a thorny shrub of the Punjab Sind and Guzerat whose fruit is eaten It is used as fuel, and the branches are made into wattled frames for the walls of huts *Solanum* contains several shrubs, many of them occurring in waste places The largest is perhaps, *S verbascifolium*, Linn, Kurz ii 225, Gamble 58 Vern *Dursul* Nep, *Sivor*, Lepcha, a small tree or large shrub of Northern and Eastern Bengal and Burma It has a grey bark and light yellow soft wood with scanty, moderate sized often subdivided pores and numerous short medullary rays The annual ring by a line of larger pores (E 3314 Kalimpung, Darjeeling, 4 000 f

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Order LXXV. SCROPHULARINEÆ.

Contains only very few genera of woody plants such as *Brandisia* an *Brandisia* contains two species one from Bhutan the other *B discolor* H Th, Kurz ii 250 from the hill forests of Martaban at 2 000 to 3 000 feet

The *Paulownia P imperialis* Bth, a handsome flowered tree often for ornament, belongs to this Order

1 WIGHTIA, Wall

1. W. gigantea, Wall, Gamble 581 Vern *Lakori*, Nep., *Bop*, Lepcha

Bark grey, smooth, of unequal thickness, on the outside ½ inch thick, much thinner white, modera distributed

Hill fore

A huge ... n clasping, aerial roots ... masses of pink flowers above the summit of the latter

The wood is used to make Buddhist idols, it is light and very soft, but does not warp The stem is often 3 to 4 feet in girth

E 3323 Ranguim, Darjeeling 6,000 feet

A small tree. Bark grey or brownish grey, with deep longitudinal furrows. Wood grey, compact, hard. Pores small, often subdivided. Medullary rays fine and moderate-sized. Numerous fine bands of softer tissue which on a transverse section divide the wood between the medullary rays into small squares.

Dry zones of North-West and South India.

Growth moderate, 10 rings per inch of radius. Weight, 42 to 52 lbs. per cubic foot (*Brandis*); our specimen gives 46 lbs. Used for fuel, in Sind for building, and in Cutch for agricultural implements. The bark when wounded gives a gum, and the liber is made into ropes. The pulp of the fruit is eaten.

		lbs.
P 449.	Ajmere	46

2. EHRETIA, Linn.

Species about 8. *E. serrata*, Roxb. Fl. Ind. i. 596; Brandis 339; Kurz ii. 210; Gamble 57. Vern. *Pursan, kalthaun*, Pb.; *Púnyan, púnjlawái, panden, koda, kúrkúna, arjún*, Hind.; *Narra*, Garhwal; *Shaursi*, Kumaun; *Rend*, Kurku; *Ridi*, Baigas; *Nalshuna, chillay*, Nep.; *Bual*, Ass.; *Kala-aja*, Beng., is a tree of the Sub-Himalayan tract from the Indus to Bhutan ascending to 5,000 feet, Eastern Bengal, and Chittagong. Brandis says "the wood is light brown, with white specks, fairly even and compact, soft, not heavy, easily worked, made into scabbards, sword-hilts, gun-stocks, and employed for building and agricultural implements." Aikin in Wallich's List of 1831 gives 3·3 rings per inch of radius for the rate of growth. Kyd gives for the weight, 37 lbs. per cubic foot, and P = 530. The fruit is eaten. *E. aspera*, Roxb. Fl. Ind. i. 598; Beddome clxvi. Vern. *Tella júvi*, Tel., is a small bushy tree of dry barren places in South India; as is also *E. buxifolia*, Roxb. Fl. Ind. i. 598; Beddome clxvi. Vern. *Bapana-búri*, Tel. *E. ovalifolia*, Wight; Beddome clxvi., is a small tree of Coimbatore, Madura and Tinnevelly up to 2,000 feet, and *E. Wightiana*, Wall.; Beddome clxvi., a small tree of the Tinnevelly Gháts.

1. E. lævis, Roxb. Fl. Ind. i. 597; Beddome t. 246; Brandis 340; Kurz ii. 210. Vern. *Chamrúr, kóda, darar, datranga*, Hind.; *Tamboli*, Banda; *Mosonea*, Uriya; *Dotti, disti, gilchi*, Gondi; *Datranga*, Mar.; *Paldatam, redda pul-mera, seregad*, Tel.; *Kappura*, Kan.

A moderate-sized tree. Bark ⅓ inch thick, grey. Wood greyish white, hard. Annual rings indistinctly marked. Pores small, grouped in small clusters or radial lines. Medullary rays fine, short, numerous, distinctly visible on a radial section.

Suliman Range, Punjab, Sub-Himalayan tract, Oudh, Bengal, Burma and the Andaman Islands, Central and South India.

Growth moderate, 5 to 8 rings per inch of radius. Weight, 33 to 38 lbs. per cubic foot. Wood tough, durable, used for agricultural implements and building. The fruit is eaten, as is also the inner bark in times of famine.

		lbs.
O 257.	Garhwal (1868)	33
C 1155.	Ahiri Reserve, Central Provinces	38

2. E. obtusifolia, Hochstetter; Brandis 340.

A small shrub. Bark grey, thin. Wood resembling in structure that of *E. lævis*.

Salt Range in the Punjab, Sind and Rajputana.

P 3245. Ajmere.

3. E. Wallichiana, Hook. f. and Th.; Gamble 57. Vern. *Boeri, dowari*, Nep.; *Kalet*, Lepcha.

A large tree, sometimes gregarious. Wood grey, moderately hard. Annual rings marked by light-coloured belts. Pores small and moderate-

sized, in scattered groups and short radial lines Medullary rays short, fine, uniform, distinctly marked on a radial section

Darjeeling Forests, from 2 000 to 7 000 feet

Growth moderate 7 rings per inch of radius Weight, 33 lbs per cubic foot The wood is used for building, for charcoal, and occasionally for making tea boxes

	lbs
E 696. Sepoydura Forest, Darjeeling, 5,500 feet . .	33

ORDER LXXIII. CONVOLVULACEÆ

Contains 7 genera of Indian shrubs or climbers, *viz*, *Erycibe*, *Rivea*, *Argyreia* *Lettsomia*, *Ipomœa*, *Porana* and *Neuropeltis*

With few exceptions such as the erect-growing *Erycibe glomerata*, Wall , Kurz ii 213 of Tenasserim, they are all large climbers often with showy flowers, but of very little forest interest *Argyreia speciosa*, Sweet , Brandis 313, is the well known "Elephant Creeper"

ORDER LXXIV SOLANEÆ.

An Order of no special forest interest, though of considerable economic importance producing the potato capsicum, tomato, tobacco, datura and Cape gooseberry It contains 2 genera of Indian shrubs or small trees *Lycium* and *Solanum* *Lycium europæum*, Linn , Brandis 345 Vern *Ganger*, *kangu chirchitta niral*, Pb, is a thorny shrub of the Punjab Sind and Guzerat whose fruit is eaten It is used as fuel, and the branches are made into wattled frames for the walls of huts *Solanum* contains several shrubs, many of them occurring in waste places The largest is [illegible]

ORDER LXXV. SCROPHULARINEÆ.

Contains only very few genera of woody plants, such as *Brandisia* and *Wightia* *Brandisia* contains two species, one from Bhutan the other *B discolor* Hook f and Th , Kurz ii 250, from the hill forests of Martaban at 2,000 to 3 000 feet elevation

The *Paulownia P imperialis*, Bth , a handsome flowered tree often cultivated for ornament, belongs to this Order

1 WIGHTIA, Wall

1. W. gigantea, Wall , Gamble 581 Vern *Lakori*, Nep., *Bop*, Lepcha

Bark grey, smooth, of unequal thickness, on the outside ½ inch thick, much thinner where it touches the [illegible]

white, moderately soft, porous [illegible]

distributed Medullary rays mode[illegible]

[illegible] 2,000 to 7,000 feet

[illegible] n clasping, masses of

[illegible] t does not

E 3323 Rangirum, Darjeeling 6,000 feet

ORDER LXXVI. GESNERACEÆ.

An Order scarcely worth mentioning, as it contains but one shrubby plant, the rest being mostly handsome-flowered, herbaceous plants of the damp zones.

1. LEPTOBŒA, Bth.

1. L. multiflora, Bth.; Gamble 58. *Championia multiflora,* C. B. Clarke. Vern. *Tungrangmook,* Lepcha.

A small shrub. Bark grey, peeling off in papery lakes. Wood yellowish white, hard, close and even-grained. Pores very small but distinct, in short radial lines. Annual rings marked by closer pores. Medullary rays extremely fine.

Hills of N. E. Himalaya up to 3,000 feet.

E 3314. Pankabari, Darjeeling, 2,000 feet.

ORDER LXXVII. BIGNONIACEÆ.

Contains 8 genera of Indian trees, belonging to 2 tribes, *viz.,*—

Tribe I.—Bignonieæ . . . . . *Millingtonia* and *Oroxylum.*
„ II.—Tecomeæ . . . . *Tecoma, Dolichandrone, Heterophragma, Stereospermum,* and *Pajanelia.*

Mayodendron igneum, Kurz Prel. Report of Pegu, Appendix D; Burma For. Fl. ii. 233, is a handsome tree with scarlet flowers found in the Martaban Hills up to 2,000 feet.

To this family belong *Amphicome arguta,* Royle, a herb with large perennial rootstock, found on rocks in the North-West Himalaya; the Catalpa, *C. bignonioides,* an American tree with a greyish, handsomely-marked, very durable wood, often planted in Europe and now largely cultivated in America, and said to be good for sleepers; and numerous other large American trees with fine timber.

With few exceptions, this Order is characterised by irregular concentric bands of soft texture. The pores are moderate-sized and frequently filled with resin, and the medullary rays fine, the distance between the rays being generally equal to the transverse diameter of the pores.

1. MILLINGTONIA, Linn. fil.

1. M. hortensis, Linn.; Beddome t. 249; Brandis 347; Kurz ii. 238. *Bignonia suberosa,* Roxb. Fl. Ind. iii. 111. The Indian Cork Tree. Vern. *Nimi chambeli, akas-nim,* Hind.; *Aykayet,* Burm.; *Kát malli,* Tam.

A large tree. Wood soft, yellowish white. Pores small, numerous. Medullary rays fine, the distance between the rays somewhat larger than the transverse diameter of the pores. The specimen from the Saharanpur gardens shews distinct annual rings marked by more numerous and larger pores in the spring wood.

Cultivated in avenues and gardens in most parts of India, believed to be indigenous in Burma and the Malay Archipelago. Kurz says it is rather rare in the tropical forests from Martaban down to Tenasserim.

Weight 42 lbs per cubic foot (Skinner No 27) P = 610 Our specimen gives 40 lbs Growth fast 4 to 5 rings per inch of radius as far as we can judge from our young specimen

		lbs
O 3160	Saharanpur Gardens	40

2 OROXYLUM, Vent.

1. O indicum, Bth , Kurz ii, 237 *Calosanthes indica* Bl , Brandis 347, Gamble 59 *Bignonia indica*, Roxb Fl Ind iii 110, Beddome clxviii Vern *Mulin, mirianga, sori tatpalang, tatmorang*, Pb ? *Ullu, arlu, kharkath, pharkath, sa na, assar sauna, shjona*, Hind , *Tattun ia*, C P , *Totilla, karamkanda*, Nep , *Kering*, Garo, *Cheipong*, Mechi, *Soxong* Rajbanshi, *Pompo ia*, Uriya, *Pana, vanga, achi*, Tam , *Pamania, pampana, dundillim, donllup*, Tel , *Dhatte*, Gondi, *Tetu*, Mar , *Totilla*, Cingh , *Kyoungyabeng*, Burm , *Baladah*, And

A small tree Bark ¼ in h thick, light brownish grey, soft, yields a green juice when cut Wood yellowish white, soft, no heartwood Pores moderate-sized, uniformly di tributed Annual rings marked by more numerous pores Medullary rays fine to moderately broad, prominent on a radial section

to 3 500 feet Bengal

bs per cubic foot The used to line hats and between two layers of wickerwork to make umbrellas they may be seen in Buddhist temples in Sikkim hung up in strings or made into ornaments to suspend from the roof The tree is remarkable for its long flat sword like capsule and large dull coloured flowers Mr Manson says that the ground up bark mixed with ' hardi is used to cure sore backs in horses

		lbs
P 111	Sutlej Valley	
C 1179	Ahiri Reserve Central Provinces	27
E 582	Khookloong Forest Darjeeling Terai	32
E 2396	Bamunpokri Darjeeling Forest	31

3 TECOMA, Juss.

1 T undulata, G Don, Brandis 352 *Bignonia undulata*, Roxb Fl Ind iii 101 Vern *Reodana, rebdau*, Trans Indus, *Lahúra, luar, roir, rahíra*, Pb , *Lohuri, lohéro*, Sind , *Roira*, Mhairwarra, *Rakht reora*, Mar

An evergreen shrub or small tree Bark ½ inch thick, corky, reddish brown Heartwood greyish or yellowish brown, close grained, mottled with lighter streaks, takes a fine polish Pores small and moderate-sized, often subdivided, enclosed in small rounded patches, which are frequently arranged in concentric lines Medullary rays short, fine and moderately broad, very prominent on a radial section as long, smooth plates

The wood is for furniture inge and very handsome

		lbs
P 943	Salt Range Punjab	64

4. DOLICHANDRONE, Fenzl.

Contains 5 Indian trees. *D. arcuata*, Hook. f. and Bth. Gen. Plant. ii. 1046 (*Spathodea arcuata*, Wight; Beddome clxix.) Vern. *Ran-palai*, Tam.; *Mersinghi*, Mar., is a tree of the Palghát and Coimbatore forests. *D. crispa*, Seem. (*Spathodea crispa*, Wall.; Beddome clxviii.; Brandis 350. *Bignonia crispa*, Buch.; Roxb. Fl. Ind. iii. 103) Vern. *Pumbadri*, Tam., is a handsome, white-flowered tree of South India, especially Cuddapah and North Arcot, and probably the Central Provinces.

D. falcata and *D. Rheedii* have white, soft wood, without heartwood. Medullary rays very fine. Concentric bands of soft tissue very numerous. *D. stipulata* has hard, orange-coloured heartwood, and no concentric bands.

1. D. stipulata, Seem.; Bth. and Hook. f. Gen. Plant. ii. 1046. *Spathodea stipulata*, Wall.; Kurz ii. 234. *Bignonia stipulata*, Roxb. Fl. Ind. iii. 108. Vern. *Petthan*, *malwa*, Burm.

A moderate-sized deciduous tree. Heartwood orange-red, beautifully mottled, hard, close-grained. Pores numerous, small, enclosed in round patches of soft tissue which are often arranged in wavy, concentric lines. Medullary rays prominent, very fine, very numerous, generally filled with a yellow substance.

Burma and Andaman Islands.

Weight, Brandis' Burma List, 1862, No. 77, gives 48 lbs.; Skinner, No. 26, gives weight 64 lbs., P = 1386; our specimens give 56 lbs. per cubic foot. Wood used for bows, spear handles, oars and paddles. Major Ford says it is a durable wood for house-posts and makes good furniture. Flowers orange-yellow.

		lbs.
B 2541.	Burma (1862)	58
B 2261.	Andaman Islands (1866)	54

2. D. falcata, Seem.; Benth. and Hook. f. Gen. Plant. ii. 1046. *Spathodea falcata*, Wall.; Beddome t. 71; Brandis 350. *Bignonia spathacea*, Roxb. Fl. Ind. iii. 103. Vern. *Háwar*, Oudh; *Kanséri*, Meywar; *Mendal*, *manchingi*, Banswara; *Mersingi*, Mar.; *Udda*, *wodi*, Tel.; *Mersingh*, Bhíl; *Karanjelo*, Kurku; *Nir pongilam*, Mal.

A small deciduous tree. Bark ⅓ inch thick, bluish grey, exfoliating in irregular woody scales. Wood whitish, hard, close and even-grained, seasons well, shining and glossy; no heartwood. Annual rings indistinct. Pores small, oval and subdivided, arranged in wavy, narrow, concentric bands. Medullary rays very fine, very numerous.

Oudh, Rajputana, Central and South India.

Growth moderate, 7 to 8 rings per inch of radius. Weight, 42 to 43 lbs. per cubic foot. Wood used for building and agricultural purposes. Flowers white, leaves small.

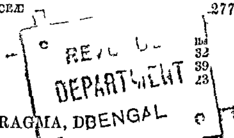
		lbs.
C 1139.	Ahiri Reserve, Central Provinces	42
W 995.	Sahyádri Gháts, Ahmednagar	43

3. D. Rheedii, Seem.; Bth. and Hook. f. Gen. Pl. ii. 1046. *Spathodea Rheedii*, Wall.; Beddome clxviii.; Kurz ii. 234. Vern. *Deyadanga*, Cingh.; *Thakootma*, Burm.

Wood white, soft. Structure similar to that of *D. falcata*, but medullary rays very prominent on a vertical section.

Burma, Malabar, Ceylon and the Andamans.

Growth moderate, 7 to 13 rings per inch of radius. Weight, 23 lbs. (Adrian Mendis); our specimens give 32 to 39 lbs.; Brandis' Burma List, 1862, No. 79, gives 35 lbs. Flowers white.



		lbs
B 2545	Burma (1862)	32
B 2252	Andaman Islands (1866)	39
No 18	Ceylon Collection	23

5 HETEROPHRAGMA, DC

Wood soft, no heartwood Pores moderate sized. Medullary rays fine, the distance between the rays being equal to the transverse diameter of the pores No distinct concentric bands

1 H Roxburghii, DC, Beddome clxix *Spathodea Roxburghii,* Sprengel, Brandis 350 *Bignonia quadrilocularis,* Roxb Fl Ind iii 107 Vern *Baro kala goru,* Tam, *Bondgu,* Tel, *Pullung, warias,* Mar

A large tree Bark ½ inch thick, dark brown, exfoliating in small angular scales Wood grey rough, moderately hard No heartwood, no annual rings Pores moderate sized, uniformly distributed Medullary rays fine, visible on a radial section as long narrow plates

Chanda District Godavari Forests and Western Coast
Growth moderate 7 rings per inch of radius Weight 40 lbs per cubic foot Flowers rose coloured

		lbs
C 1106	Ahiri Reserve Central Provinces	40

2 H adenophylla, Seem, Bth and Hook f Gen Pl ii 1047, Kurz ii 236 Vern *Petthan,* Burm

A moderate sized deciduous tree Wood yellowish white moderately hard Pores moderate sized, often subdivided, uniformly distributed Medullary rays fine, numerous

Burma and Andaman Islands
Weight 41 lbs per cubic foot Flowers large dull brown

		lbs
B 1421	Tharrawaddy Burma	42

3 H sulfurea, Kurz ii 235 Vern *Thitlinda,* Burm

A deciduous tree Wood dark grey, soft, even grained, in structure resembling that of *H Roxburghii*

Burma chiefly in Prome District
Brandis Burma List 1862 No 78 gives weight 63 lbs the specimen now weighs 42 lbs Flowers yellow

		lbs
B 2547	Burma (1862)	42

6 STEREOSPERMUM, Chamisso

Contains 5 to 6 species *S amœnum* Benth and Hook f (*Spathodea amœna* A DC Brandis 349 ... from the Mauritius but Kurz ii 230 Vern *Th*... Pegu Yoma the wood little used

Wood rough Heartwood small, brown, sometimes wanting Pores moderate sized, often joined by concentric bands or lines of soft texture, which are sometimes interrupted Medullary rays fine, the distance between the rays equal to the transverse diameter of the pores

4. DOLICHANDRONE, Fenzl.

Contains 5 Indian trees. *D. arcuata*, Hook. f. and Bth. Gen. Plant. ii. 1046 (*Spathodea arcuata*, Wight; Beddome clxix.) Vern. *Ran-palai*, Tam.; *Mersinghi*, Mar., is a tree of the Palghát and Coimbatore forests. *D. crispa*, Seem. (*Spathodea crispa*, Wall.; Beddome clxviii.; Brandis 350. *Bignonia crispa*, Buch.; Roxb. Fl. Ind. iii. 103) Vern. *Pumbadri*, Tam., is a handsome, white-flowered tree of South India, especially Cuddapah and North Arcot, and probably the Central Provinces.

D. falcata and *D. Rheedii* have white, soft wood, without heartwood. Medullary rays very fine. Concentric bands of soft tissue very numerous. *D. stipulata* has hard, orange-coloured heartwood, and no concentric bands.

1. D. stipulata, Seem.; Bth. and Hook. f. Gen. Plant. ii. 1046. *Spathodea stipulata*, Wall.; Kurz ii. 234. *Bignonia stipulata*, Roxb. Fl. Ind. iii. 108. Vern. *Petthan*, *malwa*, Burm.

A moderate-sized deciduous tree. Heartwood orange-red, beautifully mottled, hard, close-grained. Pores numerous, small, enclosed in round patches of soft tissue which are often arranged in wavy, concentric lines. Medullary rays prominent, very fine, very numerous, generally filled with a yellow substance.

Burma and Andaman Islands.

Weight, Brandis' Burma List, 1862, No. 77, gives 48 lbs.; Skinner, No. 26, gives weight 64 lbs., P = 1386; our specimens give 56 lbs. per cubic foot. Wood used for bows, spear handles, oars and paddles. Major Ford says it is a durable wood for house-posts and makes good furniture. Flowers orange-yellow.

		lbs.
B 2544.	Burma (1862)	58
B 2261.	Andaman Islands (1866)	54

2. D. falcata, Seem.; Benth. and Hook. f. Gen. Plant. ii. 1046. *Spathodea falcata*, Wall.; Beddome t. 71; Brandis 350. *Bignonia spathacea*, Roxb. Fl. Ind. iii. 103. Vern. *Háwar*, Oudh; *Kanséri*, Meywar; *Mendal*, *manehingi*, Banswara; *Mersingi*, Mar.; *Udda*, *wodi*, Tel.; *Mersingh*, Bhíl; *Karanjelo*, Kurku; *Nir pongilam*, Mal.

A small deciduous tree. Bark ⅓ inch thick, bluish grey, exfoliating in irregular woody scales. Wood whitish, hard, close and even-grained, seasons well, shining and glossy; no heartwood. Annual rings indistinct. Pores small, oval and subdivided, arranged in wavy, narrow, concentric bands. Medullary rays very fine, very numerous.

Oudh, Rajputana, Central and South India.

Growth moderate, 7 to 8 rings per inch of radius. Weight, 42 to 43 lbs. per cubic foot. Wood used for building and agricultural purposes. Flowers white, leaves small.

		lbs.
C 1139.	Ahiri Reserve, Central Provinces	42
W 995.	Sahyádri Gháts, Ahmednagar	43

3. D. Rheedii, Seem.; Bth. and Hook. f. Gen. Pl. ii. 1046. *Spathodea Rheedii*, Wall.; Beddome clxviii.; Kurz ii. 234. Vern. *Deyadanga*, Cingh.; *Thakootma*, Burm.

Wood white, soft. Structure similar to that of *D. falcata*, but medullary rays very prominent on a vertical section.

Burma, Malabar, Ceylon and the Andamans.

Growth moderate, 7 to 13 rings per inch of radius. Weight, 23 lbs. (Adrian Mendis); our specimens give 32 to 39 lbs.; Brandis' Burma List, 1862, No. 79, gives 35 lbs. Flowers white.

		lbs
B 2545	Burma (1862)	32
B 2252	Andaman Islands (1866)	39
No 18	Ceylon Collection	23

5 HETEROPHRAGMA, DC

Wood soft, no heartwood Pores moderate sized Medullary rays fine, the distance between the rays being equal to the transverse diameter of the pores No distinct concentric bands

1 H ... , Beddome clxix *Spathodea Roxburghii*, ... *monia quadrilocularis*, Roxb Fl Ind iii ... Tam , *Bondgu*, Tel , *Pullung*, *warias*, Mar

A large tree Bark ½ inch thick, dark brown, exfoliating in small angular scales Wood grey, rough, moderately hard No heartwood, no annual rings Pores moderate sized, uniformly distributed Medullary rays fine, visible on a radial section as long narrow plates

Chanda District Godavari Forests and Western Coast
Growth moderate 7 rings per inch of radius Weight 40 lbs per cubic foot Flowers rose coloured

		lbs
C 1106	Ahiri Reserve Central Provinces	40

2 **H adenophylla**, Seem , Bth and Hook f Gen Pl ii 1047, Kurz ii 236 Vern *Petthan*, Burm

A moderate sized deciduous tree Wood yellowish white, moderately hard Pores moderate sized, often subdivided, uniformly distributed Medullary rays fine, numerous

Burma and Andaman Islands
Weight 41 lbs per cubic foot Flowers large dull brown

		lbs
B 1421	Tharrawaddy Burma	42

3 **H sulfurea**, Kurz ii 235 Vern *Thitlinda*, Burm

A deciduous tree Wood dark grey, soft, even grained, in structure resembling that of *H Roxburghii*

Burma chiefly in Prome District
Brandis Burma List 1862 No 78 gives weight 63 lbs the specimen now weighs 42 lbs Flowers yellow

		lbs
B 2547	Burma (1862)	42

6 STEREOSPERMUM, Chamisso

Contains 5 to 6 species *S amœnum* Benth and Hook f ...
A DC B and s 349 *Radermachera amœn* ...
from the Mauritius but wild in Ava it is ...
Kurz ii 230 Vern *Thanday* with pale lilac ...
Pegu Yoma the wood weighs 33 to 36 lbs and is reddish brown close grained but little used

Wood rough Heartwood small, brown, sometimes wanting Pores moderate sized, often joined by concentric bands or lines of soft texture, which are sometimes interrupted Medullary rays fine, the distance between the rays equal to the transverse diameter of the pores

1. S. chelonoides, DC.; Beddome t. 72; Brandis 352; Kurz ii. 230; Gamble 58. *Bignonia chelonoides*, Linn.; Roxb. Fl. Ind. iii. 106. Vern. *Pader, padri, parral*, Hind.; *Parari*, Nep.; *Singyen*, Lepcha; *Sirpang*, Mechi; *Bolzel*, Gáro; *Parolli*, Ass.; *Pareya-auwal*, Cachar; *Dharmara, atcapali*, Beng.; *Tsaingtsa*, Magh; *Padri, pon-padira, pathiri, vela-padri*, Tam.; *Tagada, thágu, kala gorú, moka-yapa, pisúl*, Tel.; *Taitu*, Berar; *Pamphunia*, Uriya; *Kírsel, tuatuka, padul*, Mar.; *Padurni*, Bhíl; *Nai-udi, mallali*, Coorg; *Kall-udi*, Kan.; *Lúnú-madala*, Cingh.; *Thakooppo*, Burm.

A large deciduous tree. Bark brown, varying in thickness up to ½ inch, outer bark corky. Wood hard, grey, no heartwood. Pores moderate-sized and large, joined by narrow, irregular, wavy, interrupted belts and lines of soft tissue. Pores frequently filled with a white substance of a resinous nature, which is prominent on a vertical section. Medullary rays short, wavy, moderately broad, numerous, prominent on a radial section as long, narrow, horizontal bands.

Bengal, Burma, Central and South India.

Growth moderate, about 7 rings per inch of radius. Weight, 45 lbs. (Kyd); 42·5 lbs. (Wallich); 48 lbs. (Skinner, No. 25); our specimens give 47 lbs. Kyd gives P = 710; Skinner 642. The wood is moderately durable, elastic, easy to work; it is used for building and is good for furniture. It is used for canoes and building in Assam, and for tea-boxes in Cachar. The roots, leaves and flowers are used medicinally.

			lbs.
C	1164.	Ahiri Reserve, Central Provinces	40
C	1172.	" " " "	38
C	1411.	Moharli " " "	46
C	833.	Bairagarh Reserve, Berar	...
E	659.	Khookloong Forest, Darjeeling Terai	51
E	673.	Bamunpokri Forest " "	48
E	632.	Eastern Dúars, Assam	40
E	1398.	Chittagong	59
D	1070.	North Arcot	50
B	2546.	Burma (1862)	52

2. S. suaveolens, DC.; Beddome clxix.; Brandis 351; Kurz ii. 231; Gamble 59. *Bignonia suaveolens*, Roxb. Fl. Ind. iii. 104. Vern. *Paral padal, padiála, padaria, parur*, Hind.; *Pandri*, C.P.; *Phalgataitu*, Melghát; *Parari*, Nep.; *Singyen*, Lepcha; *Parúl*, Beng.; *Patúli*, Uriya; *Padri*, Tam.; *Kala-goru, kuberakashi, padari, patali*, Tel.; *Hooday, billa*, Kan.; *Únt katar, padar*, Gondi; *Padar*, Kurku; *Pandan*, Bhíl; *Parúl, kalagori*, Mar.

A large deciduous tree. Bark ¼ inch thick, grey, exfoliating in large, irregularly shaped, flat scales. Sapwood large, grey, hard. Heartwood small, yellowish brown, beautifully mottled with darker streaks, very hard, seasons and polishes well. Pores moderate-sized, enclosed in long, wavy, concentric, interrupted bands of softer tissue. The pores are frequently filled with a white shining substance, which becomes yellow in the heartwood. Medullary rays fine, sharply defined, numerous, wavy, equidistant, prominent on a radial section.

Sub-Himalayan tract from the Jhelum eastwards, ascending to 4,000 feet, Bengal, Burma, Central and South India.

Weight, 44 lbs. per cubic foot (*Brandis*); our specimens give 46 lbs. The wood is fairly durable, and easy to work; it is much valued for building and makes excellent charcoal. The root and bark are used in native medicine.

		lbs
O 213	Garhwal (1868)	41
O 341	Gorakhpur (1868) .	49
C 497	Mandla Central Provinces (1869)	40
C 1114	Ahiri Reserve, Central Provinces	46
C 2745	Moharli " " "	50
C 832	Bairagarh Reserve, Berar . .	
E 1959	Chittagong	51
B 307	Burma (1867)	44

3. **S. xylocarpum**, Bth and Hook f Gen Pl ii 1047 *Spathodea xylocarpa*, T And, Brandis 349 *Bignonia xylocarpa*, Roxb Fl Ind. iii 108, Beddome t 70 Vern *Kharsing, bersinge*, Mar, *Jai mangal, sondar-padal*, Mandla; *Dhóta mara, dhotte*, Gondi, *Zelo*, Kurku, *Vadencarni*, Tam, *Ghansing*, Kan

A deciduous tree. Bark ¼ inch thick, light grey. Sapwood large, grey, heartwood very hard, brown Annual rings marked by an irregular belt of numerous pores Pores small and moderate sized, often subdivided, each pore or group of pores in a small patch of soft tissue, these patches are frequently grouped in zig zag and more or less concentric lines In the heartwood the pores are generally filled with a yellow substance Medullary rays short, fine.

Satpura Range, Khandeish and South India
Growth moderate 7 to 8 rings per inch of radius Weight, 47 lbs per cubic foot
Wood tough and elastic, close grained, used for cabinet work

		lbs
C 2810	Melghat, Berar (sapwood)	36
C 958	Guzerat .	47
W 996	Sahyadri Ghâts Ahmednagar	47

4. **S. fimbriatum**, DC, Kurz ii 231 Vern *Thanthat*, Burm

A deciduous tree Heartwood small, dark brown Sapwood light brown Wood very hard in structure similar to that of *S suaveolens*

Martaban and Tenasserim in Burma
Weight, 54 lbs per cubic foot

		lbs
B 2696	Tavoy (Wallich 1828)	54

Nos E 719 (52 lbs) from Chittagong, D 1284 (54 lbs) from the Anamalai Hills, B 2355 (52 lbs) and B 2234 (56 lbs) from the Andamans probably belong to this genus

Wood rough, yellowish grey, moderately hard, with a small heartwood, in structure resembling *S suaveolens*

7 PAJANELIA, DC.

1. **P. multijuga**, DC, Kurz ii 237 Vern *Kyoungdouk, lingalun*, Burm, *Kaukonda*, And.

A large evergreen tree Bark ½ inch thick ... rough
Wood orange brown, very hard, close grained P...
filled with yellow resin, each pore surrounded b...
tissue, uniformly distributed. Medullary r...

Lantana alba, Miller; Brandis 369; Kurz ii. 253 (*L. dubia*, Roxb. Fl. Ind. ii 89) is a shrub of the Punjab, Sind, the North-West Sub-Himalayan tract up to 3,000 feet, the Dekkan and South India.

Holmskioldia sanguinea, Retz; Brandis 370; Kurz ii. 256; Gamble 62. (*Hastingia coccinea*, König; Roxb. Fl. Ind. iii. 65.) Vern. *Kub-tolia*, Kumaun; *Sarputtia*, Nep.; *Sivettachim*, Lepcha, is a large straggling shrub with showy scarlet flowers in a scarlet membranous calyx, common in the outer Himalaya from the Sutlej to Assam up to 3,000 feet, and in the Prome district of Burma.

Glossocarya mollis, Wall.; Kurz ii. 257, is a shrub of Tenasserim. *Hymenopyramis brachiata*, Wall.; Kurz ii. 258, is an evergreen climber of the Prome forests.

Symphorema contains 2 climbers of South India: *S. polyandrum*, Wight, from near Madras, and *S. involucratum*, Roxb. Fl. Ind. ii. 262; Kurz ii. 254. Vern. *Súrúdú*, Tel.; *Nwaysat*, Burm., of the forests of the Coromandel Coast and Burma. *Sphenodesma* contains 5 species, among which *S. Wallichiana*, Schauer (*Symphorema pentandrum*, Kurz ii. 255) is a climber of Eastern Bengal and Tenasserim; and *S. unguiculata*, Schauer (*Symphorema unguiculatum*, Kurz ii. 255.) Vern. *Ka-nway*, Burm., is a climber of Burma and the Andaman Islands. *Congea tomentosa*, Roxb.; Kurz ii. 256. Vern. *Tha-ma-ka-nway*, Burm., is a large climbing shrub of South India, Chittagong and Burma, with beautiful pink, lilac or white bracted flowers.

With the exception of teak, the trees of this Order have no dark-coloured heartwood. The annual rings are generally well marked. The pores are small or moderate-sized, rarely large. Medullary rays generally fine and equidistant. The wood of *Avicennia* is anomalous.

1. CALLICARPA, Linn.

Contains about 7 species. *C. macrophylla*, Vahl.; Roxb. Fl. Ind. i. 393 (also *C. incana*, Roxb.) Brandis 368; Kurz ii. 274. Vern. *Pattharman, bá-pattra, baunu*, Jhelum; *Súmáli*, Chenab; *Denthar, drúss*, Ravi; *Daya, shiwali*, Kumaun; *Mathara, mattranja*, Beng., is a tall shrub of Northern India, found as far north as Hazara, and up to 6,000 feet. *C. lanata*, Linn.; Beddome clxxiii; Roxb. Fl. Ind. i. 391, is a tree of the hills of Western and South India. *C. rubella*, Ldl.; Kurz ii. 274; Gamble 60. Vern. *Sugroomook*, Lepcha, is a small tree of the North-East Himalaya and the hills of Martaban. *C. longifolia*, Lamk.; Kurz ii. 275, is a shrub of Eastern Bengal and Burma.

1. **C. arborea**, Roxb. Fl. Ind. i. 390; Brandis 368; Kurz ii. 274; Gamble 60. Vern. *Ghiwala, dera, shiwali*, Kumaun; *Bormala*, Beng.; *Goehlo*, Nep.; *Kodo, kozo*, Mechi; *Súng-a*, Lepcha; *Doika*, Rajbanshi; *Khoja*, Ass.; *Makanchi*, Gáro; *Turmong*, Magh; *Doung-sap-pya*, Burm.

A moderate-sized tree with brownish, rough grey bark. Wood grey, moderately hard, even-grained. Annual rings visible. Pores small to large, oval and often elongated, subdivided into numerous compartments, often in radial lines. Medullary rays broad, short, with numerous fine rays between them, well marked on a radial section; the distance between the rays greater than the transverse diameter of the pores.

Kumaun, Oudh, Eastern Bengal and Burma; chiefly in second-growth forest.

Growth fast, 5 rings per inch of radius. Weight, our specimens give 32 to 35 lbs. per cubic foot; Kyd gives only 22 to 25, but there was probably some mistake. The wood is not used except for charcoal.

		lbs.
E 597.	Khookloong Forest, Darjeeling Terai	32
E 2397. E 2398.	Bamunpokri, Darjeeling Terai	35

2 C cana, Linn, Gamble 60

A shrub Bark thin, grey brown Wood white, soft Annual rings marked by a line of closer pores Pores moderate sized, sometimes subdivided Medullary rays moderately broad, the distance between them greater than the transverse diameter of the pores

Bengal

Common in forests and along roadsides in the Terai and Duars extending probably southwards to the Ganges It has pretty pink flowers

E 3276 Damah Reserve W Duars

2 TECTONA, Linn fil

1 T. grandis, Linn fil, Roxb Fl Ind i 600, Beddome t 250, Brandis 354, Kurz ii 259, Gamble 60 The Teak Tree Vern *Saj*, Arab, *Saj*, *sal*, Pers, *Ságun*, Hind, *Singuru*, Uriya, *Sag*, *sagwan*, Mar, *Teka*, Gondi, *Sag*, Bhil, *Tekku*, *tek*, Tam, *Teku* Tel, *Jadi*, *sagwani*, *tega*, Kan, *Tekka*, Cingh, *Kyun*, Burm, *Jati*, Malay

A large deciduous tree Bark ½ inch thick, grey, fibrous, with shallow longitudinal wrinkles, peeling off in long thin flakes The sap wood is white and small, the heartwood when cut green has a pleasant and strong aromatic fragrance and a beautiful dark golden yellow colour, which on seasoning soon darkens into brown mottled with darker streaks The timber retains its fragrance to a great age, the characteristic odour being apparent whenever a fresh cut is made It is moderately hard, exceedingly durable and strong, does not split, crack, warp, shrink, or alter its shape when once seasoned, works easily and takes a good polish The annual rings are distinctly marked by larger and more numerous pores in the spring wood The pores are mostly single but sometimes subdivided, those of the inner layer of each annual ring are large, while those of the outer portion are moderate sized and small The medullary rays are short, moderately broad, equidistant, the distance between the rays about equal to the transverse diameter of the larger pores The pores are well marked on a longitudinal section, and the medullary rays give the wood a beautifully mottled appearance The pores are sometimes filled with a white substance The pith is large and quadrangular

The Teak tree is found in Central and South India and Burma Its northern

Annual rings —It is now established beyond doubt that the concentric rings which are so marked in the wood of Teak correspond each to one year's growth The following statement exhibits the rings counted on sections of trees grown in the Nilambur plantations These sections were cut in 1877 and were taken from the base of the stem and with a few exceptions the number of rings agrees with the age of the tree
shews the grad
exhibits the nu
different ages
average of each y

They therefore exhibit a more rapid rate of growth than average specimens would do.

Year of plantation.	Number of rings counted.	Average diameter of section (wood only).	Average diameter of heartwood.	Rings per inch of average radius.
		Inches.	Inches.	
1844	33	20·8	19·3	3·17
1845	31	21·1	18·7	2·95
1846	31	20·	17·7	3·10
1847	30	23·8	21·5	2·52
1848	28	16·7	15·4	3·34
1849	28	18·1	16·2	3·09
1850	27	14·	12·5	3·85
1851	25	15·2	13·4	3·28
1852	32*	15·2	13·5	Omitted.
1853	24	15·1	12·	3·17
1854	24	17·3	15·2	2·77
1855	23	12·4	10·5	3·71
1856	21	15·2	12·6	2·76
1857	20	12·2	10·6	3·27
1858	19	14·	11·3	2·71
1859	18	14·	10·6	2·57
1860	17	12·9	10·4	2·63
1861	16	13·1	10·5	2·44
1862	15	11·7	9·	2·56
1863	14	13·6	10·4	2·06
1864	13	12·5	9·4	2·08
1865	12	9·4	6·9	2·55
1866	11	10·4	7·3	2·11
1867	10	11·8	8·3	1·69
1868	9	10·5	7·6	1·71
1869	8	7·4	4·8	2·16
1870	7	7·4	4·5	1·89
1871	7	7·7	4·3	1·81
1872	5	6·5	2·6	1·53
				Average 2·62 rings per inch of average radius.

* There is evidently a mistake here. The tree which yielded this section must have been an older tree standing in the plantation of 1852.

The sections ranged in age from 5 to 33 years. Dividing them into three groups, two of 10 years each, and the third of 9 years, we obtain the following as the mean diameter in inches of these three groups:—

		Inches.
Mean diameter of trees	5—14 years old	9·72
	15—24 „	13·79
	25—33 „	18·71

Name of plantation.	Age.	Year of plantation.	[illegible]	Average [illegible]	Average [illegible]	[illegible]	Girth at [illegible]	Rings per [illegible]	Remarks.
	Years			Inches.	Inches.				
Thongzai . . .	15	1863	15	6 4	4 5	61	20	4 7	Burnt yearly.
Myodwin . . .	15	1863	15	6 2	4 8	65	17 5	4 8	Protected
Kangyee . .	13	1865	14	4 8	3 0	44	14	5 8	Burnt yearly.
Choungwah . .	12	1866	12	5 8	4 0	46	16 5	4 1	Protected.
Ditto . .	10	1868	10	5 0	2 1	42	14	4·0	Do
Ditto .	8	1870	8	4 8	2 4	38	13 71	3 3	Do.
Quaymakeing . .	11	1867	11	5 9	3 5	53	18 75	3 7	Do.
Ditto .	9	1869	9	4 4	2 6	49	13 6	4 1	Do
Ditto (private)	10	1869	10	7 5	5 2	53	23	2 6	Burnt yearly.

P.

Year of plantation	Number of rings counted	AVERAGE DIAMETER OF SECTION IN INCHES		Rings per inch of average radius
		Wood.	Heartwood	
SOUTH KANARA (PARAPPA PLANTATION).				
Not known . . .	10	9	4 9	2 22
Ditto . . .	5	5 5	2 5	1 81
NORTH KANARA (KALANADI VALLEY).				
Sulageri, 18 years old	18	8	6	4 5
	17	8 8	7 5	3 9
	17	9	7·	3 7
Murdi, 12 years old	8	7 5	Heartwood not distinct.	2 1
	11	6		3 7
	11	5 7		3 8
Kadra, 10 years old	8	6 5		2 5
	8	7 5	5	2 1
	7	7	4	2·
BENGAL (BAMUNPOKRI).				
1868	8	6 5	2 5	2 5 measured 1877.
1871	6	6	1·	2 ,, ,,
1872	4	5	1·	1·6 ,, ,,
ANDAMANS (PORT BLAIR).				
1873	6*	10 1	6·	1 2 ,, ,,
BURMA (TENASSERIM)				
Shoaygoon, 1856 .	22	5 3	3 5	8 3 ,, 1878.
Koloon ,, .	22	4 6	3·	9 6 ,, ,,
Thinganneenoung ,, .	21	7 6	4 5	5 5 ,, 1877.

* The tree was probably older.

It will be noticed that as far as the data go, which are furnished by the sections received, South Kanara, North Kanara and Bamunpokri exhibit an increase of diameter similar to that of Nilambur; while in the samples from Burma the annual rings are much narrower and the specimen from Port Blair shewed an extremely rapid rate of growth.

Girth and height at different ages.—The following measurements illustrate the rate of growth of Teak in plantations in different provinces as nearly as possible from 5 to 5 years. The Nilambur plantation again furnishes the largest amount of information:—

Age.	Mean girth at breast high.	Total height of tree.
	Nilambur plantation.—Alluvial soil.	
3—7 years	12 inches	29 feet.
8—12 "	17 "	63 "
13—17 "	23 "	68 "
18—22 "	25 "	71 "
23—27 "	27 "	77 "
29 "	34 "	87 "
30 "	35 "	85 "
31 "	32 "	75 "
32 "	34 "	92 "
33 "	37 "	95 "
	Nilambur plantation.—Gneiss and laterite.	
7 years	13 inches	30 feet.
16 "	14 "	50 "
20 "	21 "	50 "
24—26 "	22 "	52 "
30 "	24 "	50 "

These figures are taken from that portion of Colonel Beddome's report (paragraphs 11—44) which contains his notes on each year's plantation, and the data recorded are stated to be average figures.

In another part of his report (paragraph 81), however, he gives data which would seem to shew that the average size of the trees in the older plantations (all on alluvial soil) is considerably greater. He there states the dimensions of the largest, smallest and medium sized trees in four plantations, the results being as follows:—

Age.	Mean girth (probably breast high).			Length of bole.		
	Largest.	Medium.	Smallest.	Largest.	Medium.	Smallest.
	Inches.	Inches.	Inches.	Feet.	Feet.	Feet.
30 years	67	47	29	79	65	50
31 "	69	49	30	80	65	50
32 "	63	46	30	83	67	50
33 "	68	56	43	86	68	50

The first three lines shew the average of 6 trees in each case, and the last line the average of 8 trees each. It is distinctly stated that the length is that of the bole, and not of the entire tree.

The plantations made on gneiss and laterite shew a much slower rate of growth than those on alluvial soil; the difference being considerable in height, and much less in girth.

In 1878 C[illegible] 1844, the first five [illegible] obtain information regarding the [illegible] half height. The results were [illegible] nt., while the *inside* trees shewed 18·5 per cent. only, a difference such as might have been expected. The *outside*, the re[illegible]

[illegible] This assumption is borne out by the present figures. The trees grown [illegible]

	Age, in years.	Mean girth, breast high, in inches.	Total height of tree, in feet.
Pegu	4	5—9	16—27
	10	15	40—45
	15	23	...
Thinganeenoung	21	27	50—60
Garden—Moulmein	22	40	...

The fourth line is the average of 150 trees *in the Thinganneenoung* plantation in the Attaran district of Tenasserim, given in paragraph 146 of the report for 1876-77 of the Tenasserim forests. [illegible]

[illegible] report for 1875-76. *Age 13—15* years, mean girth 14 inches height 32 feet. [illegible]

Plantation	Age, in years	Mean girth, breast high, in inches	Total height of tree, in feet.
Machna, Central Provinces	6	7	15—23
Pili, Berar	6	4	10
Sakata, Central Provinces	7	11	20—25
Pili, Berar	8	8	20
Sonawani, Central Provinces	9	12	30—40
Machna, Central Provinces	8—10	9	17—30

Compared with Malabar and Burma, the rate of growth is slow, as may be expected in a dry climate and near the northern limit of the tree.

Outside the range of the natural growth of teak, the following data, regarding its rate of growth, are available:—

Plantation.	Age, in years.	Mean girth, breast high, in inches.	Total height of tree, in feet.
Bamunpokri (Sikkim)	5	5·5	12—15
Hoolingamara (Chittagong)	{ 5 4	11 6	20—25 10—15
Rampahar (Chittagong) 3 specimens	7	17	20—30
Kulsi (Assam)	5	11	29
Makúm „	4	9	18
„ „	5	11	27
„ „	7	16	31

The growth at that early age is fairly good; but it does not follow from these figures that teak in Bengal and Assam will attain a great age, and produce good timber.

The following instances of older trees of known age in Assam and Bengal are on record:—

Locality.	Number of trees measured.	Age, in years.	Mean girth, in inches.
Gauhati, banks of the Brahmaputra	15	37	85
Royal Botanical Gardens, Calcutta	19	6	16
Ditto ditto	8	70	79
Garden at Mohesh, Serampore	27	50	52

The trees at Gauhati were on an average 30—50 feet high.

The trees in the Botanical Garden, Calcutta, were measured in January 1856. The older trees have since been blown down by the cyclones of 1864 and 1867.

On the banks of the Hooghly at Mohesh, below Serampore, stands a grove of teak trees planted in 1828. Their mean girth, breast high, taken by measuring 27 average-sized trees, was 52 inches. The trees were measured in January 1878, and were therefore 50 years old. They are from 40—50 feet high.

In paragraphs 177 and 183 of Dr. Schlich's report for 1872-73, the dimensions of a large number of Teak trees at different stations of Lower Bengal are given; but unfortunately no trustworthy information regarding their age is available.

Cubic contents of trees at different ages.—In paragraph 4 of Colonel Beddome's report a statement is given exhibiting the dimensions of the trees, sections of which were sent to the Paris Exhibition. As already stated, these trees were selected as samples of the dominant trees, *viz.*, of those which will eventually be selected to remain on the ground as the ultimate crop; but, with few exceptions, they were not selected from among the largest individuals which had much outrun their neighbours. Arranging them in groups from 10 to 10 years, the following results are obtained:—

Age.	Height of tree, in feet.	Girth at base, in inches.	Length of bole, in feet.	Mean cubic contents, in cubic feet.
4—13 years	48—75	21—60	32—56	10·6
14—23 „	65—110	51—69	40—70	23·8
24—33 „	70—110	60—105	41—72	51·3

This gives us the cubic contents at different ages as follows —

Mean age	Cubic contents, in cubi feet	Periodical annual increment in cubic feet
9 .	10 6	1 1 to 9 years
19	23 8	1 3 from 9 to 19 years
29 .	51 3	2 8 from 19 to 29 years

The annual increment increases steadily to the age of 30 years and probably continues increasing for a considerable time beyond it

Number of trees and cubic contents of growing stock per acre —Regarding the number of trees and the growing stock per acre at different ages we depend almost entirely upon Nilambur for our data Sample areas of half an acre each were selected in each of seven plantations, each tree was measured the cubic contents determined, and the following is the result It is not expressly stated, but it is probable, that these samples areas were all selected on alluvial soil* —

Name and year of plantation						Cubical con tree	Cubical con acre	Average annual incre tree	Average annual incre acre
Iravelly Kava	1844	33	120	59	9 7	41	4 879	1 2	148
Elanjerry	1845	32	158	61	7 9	30	4 742	9	148
	1846	31	156	60	7 4	27	4 204	9	136
Moolathamanoo	1847	30	140	62	7 5	27	3 713	9	124
	1848	29	156	60	6 8	21	3 243	7	112
Elanjerry	1858	19	270	45	5 0	8	2 203	4	116
Wallashary	1868	9	750	40	3 4	3	2 491	4	277

is 8 feet On the other hand, 0 feet, and it is probable that per acre On page 155 of the rests (Toonzaleen) is described trees with clear stems to the

* The length of stem to the top of sale measurement where the head begins of every tree in plantations of 1844 to 1848, both inclusive was measured by sending up a climber with a tape In the plantations of 1858 and 1868 a large number of felled saplings were available of which the average was taken

The mean quarter girth was determined in the following manner Ten saplings were measured *breast high and in the middle of the stem at half its length and this gave ⅘ as the reducing factor* Those trees 30 inches in girth breast high were found to have a girth of 25 inches in the middle of the bole

first branch of 50 feet, the girth between 4′ 6″ and 6′ 5″; this would give 91 trees to the acre. Full stocked forests of Oak and Beech in Europe 130—180 years old under favourable conditions contain 120—140 trees per acre, with a cubic contents (including tops and branches) of about 11,000 cubic feet. A forest of silver fir in the Jura, 180 years old, was found to contain 94 trees per acre, with a cubic contents of 16,000 feet.

The total area now stocked at Nilambur is 3,436 acres, of which 1,787 are stocked with a full crop on alluvial soil, the rest not being expected to yield a full crop. In his estimate of the future value of the plantations, Colonel Beddome only assumes 6,000 cubic feet as the full crop expected on alluvial soil.

Mr. Carter reports from Burma that at Magayee and Kyekpyoogan in each plantation the trees upon ¼ acre were measured. A breadth of 24 feet and a length of 454 feet was given to this area, so as by extending over a greater portion of the plantation, to avoid the experiment being confined to a small spot on which the growth was particularly good. But this strip was not taken in a part of the plantation which contained many blanks, but rather in a part which was well stocked without choosing the very finest parts of the plantation. These measurements then do not profess to shew the exact state of the plantations, but to give data which are nearly normal. In the 1873 and 1872 plantations—after the deduction of the mean girth, 3 sample trees in each were felled and the contents calculated by sections, the length of which were taken at 2 feet. In the 1875, 1874, 1869 and 1870 plantations only one sample tree in each was cut; and in those of 1876 and 1871 no trees were cut, enough data being to hand as to the reducing factor to enable the contents of an average tree to be calculated without its being felled. In the 1871 plantation only were the heights and girths so divergent as to render the separation of the trees into two classes with a sample tree for each necessary. The plantation of 1868 at Kyekpyoogan is so poorly-stocked and so badly grown that no measurements were taken as they would have been valueless for comparison.

The results, as might be expected from plantations with only an interval of one year, diverge very widely.

The plantations of 3 and 4 years shew an abnormally high annual increment; those of a 8, 9 and 10 years an abnormally low one, attributable to their increase for the last 3 years being almost nil, due most probably to fire and in part also to caterpillars consuming the first growth of leaves.

Name and year of plantation.	Age.	Number of trees per acre.	Average height.	Average girth at breast height.
	Years.		Feet.	Inches.
Magayee, 1876 . . .	3	1,059	10	6 (3—9)
1875 . . .	4	1,048	22	8 (3—12)
1874 . . .	5	952	10	6 (2—10)
1873 . . .	6	1,084	18	8 (4—14)
1872 . . .	7	1,100	26·6	10 (4—17)
Kyekpyoogan, 1871 . . .	8	876	20	8½ (2—16)
1870 . . .	9	800	30	9½ (6—17)
1869 . . .	10	848	30	10 (6—18)

In natural forests, where Teak is associated with bamboos and other trees, the number of first and second class Teak trees (above 4′ 6″ in girth) rarely attains 10

trees pe1 acre ove1 large areas The following are instances of forests exceptionally well stocked with Teak :—

Date of survey	Forest	Area.	NUMBER PER ACRE		Total
			CLASS		
			Girth above 6 feet.	Girth 4½ to 6 feet	
1876 .	Bimaram (Central Provinces)	50 acres . .	4	4 3	8 3
1870 71 .	Pegu (Prome District) . .	17 square miles	3 6	3 0	6 6

The weight and transverse strength have been determined by the following experiments —

Experiment by whom conducted	Year	Wood whence obtained	Weight	Number of experiments	Size of bar	Value of P
					Ft in in	
Wallich . .		Ceylon	47			
,, . . .		Travancore	42			
,, . . .		Malabar	37			
,, . .		Moulmein	31 5			
A Mendis, No 85 .	1855	Ceylon	55			810
,, No. 86	,,	Cochin	44		2 × 1 × 1	672
,, No 87	,,	Moulmein	42			640
Bennett, No 12	1872	,, .	42	3	3 × 1½ × 1½	747
French (Erode)	1861	South India .		3	1 × 1 × 1	467
Cunningham . .	1854	Vindhyan hills	44 5	1	3 × 1 × 1	953
Puckle . .	1859	Mysore . .	43	4	2 × 1 × 1	730
Couch (Plymouth) .		India . .	38 5	2		
Simpson . . .		Thoungyeen and Zimmee — Good timber girdled	43 5	13		478
,, . . .		Young timber girdled	43	4		660
,, . . .		Large timber girdled	38	8	3 × 1½ × 1½	591
,, . . .		Dead timber not girdled	39 5	5		631
Skinner, No 122 .	1862	Malabar . .	45			814
,, . .	,,	Moulmein .	43			809
,, . . .	,,	Pegu . .	37			736
Fowke . .	1859	Nagpore . .	41	4		472
Kyd . . .	1831	Burma	38	1	2 × 1 × 1	663
Campbell . .	1831	,, (unseasoned) .	47	4		634
,, . . .	,,	,, ,, .	43	2		604
,, . . .	,,	Java . .	43	1	6 × 2 × 2	693
,, . . .	,,	Bombay . . .	41	2		537
,, . . .	,,	Malabar . .	48	1		469
Maitland . .	1862	Burma . . .	41		3 × 1½ × 1½	589 to 839
Baker . . .	1829	Rangoon . (Received at Cossipore, April 1825)	43	5	6 × 2 × 2	658
,, . .	,,	Bombay	43	6	,, ,, ,,	652
,, . .	,,	Pegu	46	3		602
,, .	,,	Malabar	45	3		783
,,	,,	Burma (Received at Cossipore, April 1826)	43	3	5¼ × 2 × 2	756
,, .	,,	Malabar	48 5	3		649
,, . .	,,	Malabar (Received at Cossipore, April 1827)	46 5	2		683
,, . .	,,	Bengal		12	3 × 1½ × 1	693
,, . .	,,	Bengal .		14	2 × 1 × 1	666
,, .	,,	,, very old, taken from a Dutch house at Cossipore . .	41 5	6	7 × 2 × 2	631
,, . .	,,	,, ,,	40 5	6	,, ,, ,,	731
Russell . . .	1862	,, ,,	41	3	1¼ × 1 × 1	835

Experiment by whom conducted.	Year.	Wood whence obtained.	Weight.	Number of experiment.	Size of bar.	Value of P.
					Ft. in. in.	
Brandis . . .	1862	Burma (No. 80)	40 to 51	...	4 × 1 × 1	570 to 867
,, . . .	1864	,, ...	40·5	12	6 × 2 × 2	563
,, . . .	,,	,, ...	40	6	6 × 2 × 1½	577
,, . . .	,,	,, } Half seasoned {	45	10	6 × 2 × 2	531
,, . . .	,,	,, } Half seasoned {	43	9	6 × 2 × 1½	584
,, . . .	,,	,, } Half seasoned {	46	20	6 × 2 × 2	598
,, . . .	1865-66	,, ...	38	4	,, ,, ,,	617
,, . . .	,,	,, ...	38	9	6 × 2 × 1½	670
,, . . .	,,	,, ...	40·5	6	3 × 1 × 1	812
,, . . .	,,	,, ...	38	11	2 × 1 × 1	619
,, . . .	,,	,, ...	37	17	2 × 1 × ¾	612
Laslett, p. 125 . .	1876	Moulmein, No. 1 . . .	45·5	6	} 7 × 2 × 2 {	684
,, ,, . .	,,	,, No. 2 . . .	50	6	} 7 × 2 × 2 {	637
,, p. 126 . .	,,	,, ...	48·5	6	......	...
Dundas . . .	1877	Moulmein	34	12	10 × 4 × 6	467
,, . . .	,,	,, ...	34	12	2 × 1 × 1	701
Warth . . .	1878	Central India . . .	43·5	5	......	...
,, . . .	,,	Malabar	42	3	......	...
,, . . .	,,	Burma	40	4	......	...

The weight may, therefore, for practical purposes, be taken approximately at 40 lbs. per cubic foot, and the value of P. at 600, on an average. Molesworth, however, in 'Graphic Diagrams for strength of teak beams' gives: Weight 45 lbs., P = 800, E = 5,000. Captain J. C. Dundas, V. C., R. E., in his report on experiments (see above) made at Lucknow in 1877 and 1878 (Roorkee Professional Papers April 1879, Vol. VIII, No. 32), in which he gives the weight at 34 lbs., P = 470 and E. = 2,200 as an average, says that logs as received at Lucknow shew a weight of nearly 50 lbs. per cubic foot, but that after being well dried and sawn into scantlings, the weight falls to 34 or 35 lbs. His value for P. is a reliable one, for it is based on experiments made with beams of the large size of 10 feet × 4 in. × 6 in.

Teak wood does not split, crack, warp or alter its shape when once seasoned, it does not suffer in contact with iron, and is rarely, if ever, attacked by white ants. Its durability is probably due to the aromatic oil contained in the wood.

It is the chief timber of India and Burma; it is exported largely for ship-building and the construction of railway carriages. In India it is used for all purposes of house and ship-building, for bridges, sleepers, furniture, and most other purposes.

The leaves give a red dye; they are very large and are used as plates, for packing and for thatching. The oil is extracted from the wood in Burma and is used medicinally, as a substitute for linseed oil and as a varnish.

		lbs.
C 1408.	Jagmandal Reserve, Central Provinces	...
C 1409.	Ahiri Reserve, Central Provinces	38
C 2933.	Sonawani, Satpura Reserve, Central Provinces . . . (Tree planted in 1867, cut down in 1876, 10-inch girth.)	...
C 2983.	(White Teak, *Dudhia Sagun*) } Jubbulpore, Central Provinces, 1863.	41
C 2982.	(Black ,, *Telia Sagun* or oil teak) } Jubbulpore, Central Provinces, 1863.	48
C 2987.	(Stone ,, *Pattharee Sagun.*) } Jubbulpore, Central Provinces, 1863.	44

(Black Teak is rather darker coloured, but otherwise there is no difference in structure, and very little in appearance between these three specimens.)

		lbs.
C 834.	Bairagarh Reserve, Berar	46
C 2809.	Melghát, Berar (sapwood)	38
E 1202.	Bamunpokri Plantation, Darjeeling Terai, Bengal	...
Specimens from compartment	I. 1 planted 1868	...
,, ,, ,,	II. 1 ,, 1871	...
,, ,, ,,	I. 1 ,, ,, ...	...
,, ,, ,,	I. 3 b ,, 1872	...

E 3290-291	Hoolingamara Block, Sitapahar Plantations, Chittagong, 1873 and 1875	
E 3386-88	Rampahar Block, Sitapáhar Plantation Chittagong 1873	
W 1216	North Kanara Plantation Bombay Specimen from { Sulageri, 18 years old; Murdi 12 „ „; Kadra 10 „ „ }	
		lbs
W 1217	North Kanara Bombay	39
W 730	South Kanara, Madras	46
W 753	„ „ „	42
W 1206	Parappa Teak Plantation, South Kanara, Madras Saplings of 5 and 10 years growth	
W 2959.	Nilambur Plantation Malabar Specimens cut by Mr	
W 1203		
B 2551	Burma (1862)	44
B 801	Pegu	40
B 1385	Thinganneenoung Plantation Martaban Tree 54 feet high, 30 feet to first branch planted in 1856	34
B 2709	Tavoy (Wallich, 1828)	42
B 1346	Andaman Islands Tree planted at Dhunee Valley, Leaf Creek Port Blair, in 1873 Height 44 feet girth at 5 feet, 36 inches, at 21½ feet, 17 inches, at 28½ feet, 10 inches	

		lbs
No 85	Ceylon Collection (Ceylon wood)	44
„ 86	„ „ (Cochin wood)	40
„ 87	„ (Moulmein wood)	41
„ 47	Salem Collection	40

2. T. Hamiltoniana, Wall, Kurz ii 259 Vern *Tanap*, Burm

A deciduous tree Wood light brown, hard, close grained Pores small Medullary rays fine, the distance between them equal to the transverse diameter of the pores Annual rings marked by a continuous line of somewhat larger pores

Prome district and Upper Burma

Growth moderate 9 to 10 rings per inch of radius Weight, 64 lbs per cubic foot. A good wood, and likely to be useful

		lbs
B 3126	Prome, Burma	64

3 PREMNA, Linn

Contains about 20 to 25 species of Indian trees shrubs or climbers Besides those here described, most of the species are small shrubs climbers, or at most small trees, chiefly of South India and Burma *P barbata*, Wall, Brandis 367, Gamble 61, Vern *Ganhila*, Pb, *Lammar* Hind, *Michapnok*, Lepcha, is a small tree of the North East Himalaya and Sub Himalayan tract *P viburnoides* is a small deciduous tree of the forest

of Arracan and Tenas

ii 263, Gamble 61

Eastern Bengal and

climber of the forests

the structure of a clim

the distance between

Darjeeling 7,000 feet)

Experiment by whom conducted.	Year.	Wood whence obtained.	Weight.	Number of experiment.	Size of bar.	Value of P.
					Ft. in. in.	
Brandis	1862	Burma (No. 86)	40 to 51	...	4 × 1 × 1	570 to 867
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"	1865-66	"	38	4	" " "	617
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Laslett, p. 125	1875	Moulmein, No. 1	48·5	6	7 × 2 × 2	684
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" p. 126	"	"	48·5	6	......	
Dundas	1877	Moulmein	34	12	10 × 4 × 6	467
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C 2809.	Melghát, Berar (sapwood)	38
E 1202.	Bamunpokri Plantation, Darjeeling Terai, Bengal	...
	Specimens from compartment I. 1 planted 1868	...
	" " " II. 1 " 1871	...
	" " " I. 1 " "	...
	" " " I. 3 b " 1872	...

E	3290-291	Hoolingamara Block, Sitapahar Plantations, Chittagong, 1873 and 1875	
E	3386-88	Rampahar Block, Sitapahar Plantation Chittagong, 1873	
W	1216	North Kanara Plantation, Bombay Specimen from { Sulageri 18 years old; Murdi 12 „ „; Kadra 10 „ „	
			lbs
W	1217	North Kanara Bombay	39
W	730	South Kanara, Madras	46
W	753	„ „ „	42
W	1206	Parappa Teak Plantation South Kanara Madras Saplings of 5 and 10 years growth	
W	2959	Nilambur Plantation Malabar Specimens cut by Mr Brandis in 1864, Nos 1 2 and 4 aged 5 10 and 20 years and measuring 16 19 and 25 inches in girth respectively	
W	1203	Nilambur Plantation Malabar Series, Nos 1 to 33 aged 33 years to 1 year respectively	
B	2551	Burma (1862)	44
B	801	Pegu	40
B	1385	Thinganneenoung Plantation, Martaban Tree 54 feet high 30 feet to first branch planted in 1856	34
B	2709	Tavoy (Wallich, 1828)	42
B	1346	Andaman Islands Tree planted at Dhunee Valley Leaf Creek Port Blair in 1873 Height 44 feet girth at 5 feet, 36 inches, at 21½ feet, 17 inches, at 28½ feet 10 inches	

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No 85	Ceylon Collection (Ceylon wood)	44
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Prome district and Upper Burma

Growth moderate 9 to 10 rings per inch of radius Weight, 64 lbs per cubic foot. A good wood and likely to be useful

		lbs
B 3126	Prome, Burma	64

3 PREMNA, Linn

Contains about 20 to 25 species of Indian trees shrubs or climbers Besides those here described most of the species are small shrubs climbers or at most small trees, chiefly of South India and Burma *P barbata,* Wall, Brandis 367, Gamble 61, [illegible] a small tree of the [illegible] is a small deci- [illegible] vergreen small tree [illegible] Brandis 367, Kurz [illegible] a climbing shrub of [illegible] le 61, a common [illegible] white wood with [illegible] ad medullary rays, [illegible] the pores (E 3395

The structure of the wood is similar to that of *Vitex* (p. 296), but rather lighter and softer.

1. P. tomentosa, Willd.; Roxb. Fl. Ind. iii. 76; Beddome t. 251; Brandis 367; Kurz 260. Vern. *Nagal, naoru, naura*, Tel.; *Chambara*, Mar.; *Ije*, Kan.; *Boosairu*, Cingh.; *Kyunnalin*, Burm.

A moderate-sized deciduous tree with grey bark similar to that of teak. Wood smooth, light brown, the colour of teak but lighter (hence the Burmese name), moderately hard, smooth, close and even grained, seasons well. Pores moderate-sized, sometimes small, sometimes subdivided, very numerous, uniformly distributed, except that they are a little more numerous near the inner edge of the annual rings, which are fairly well marked. Medullary rays numerous, short, moderately broad, very prominent on a radial section.

South India and Burma.

Growth rather fast, 4 to 8 rings per inch of radius. Weight: Brandis' Burma List, 1862, No. 85, gives 52 lbs.; our specimens vary from 40 to 54 lbs. per cubic foot. Brandis' four experiments in 1864 gave, with bars 3′×1″×1″, Weight = 43 lbs., P. = 670. The wood polishes well, and is used for weaving shuttles in Burma. It would do for turning and fancy work.

		lbs.
B 317.	Burma (1867)	54
B 2718.	Tavoy (Wallich, 1828)	53
B 2548.	Burma (1862)	51
B 1424.	Burma	40

(Wood rough, grey, and lighter than the other specimens of *P. tomentosa*.)

2. P. longifolia, Roxb. Fl. Ind. iii. 79. *P. tomentosa*, Willd.; Gamble 61. Vern. *Gwyheli*, Nep.; *Sungna*, Lepcha; *Dhaoli*, Mechi; *Gohora*, Ass.

An evergreen tree with thin white bark and indented stem. Wood greyish brown, hard, close-grained. Annual rings well marked by a belt of darker and firmer wood on the outer edge of each ring. Pores small, often subdivided. Medullary rays fine and moderately broad, wavy.

Eastern Sub-Himalayan tract of Bengal and Assam.

Growth fast, 3 to 5 rings per inch of radius. Weight, 47 to 50 lbs. per cubic foot. Wood used for house-posts in Assam.

		lbs.
E 2400.	Sivoke, Darjeeling Terai	47
E 1267.	Lakhimpur, Assam	50

3. P. latifolia, Roxb. Fl. Ind. iii. 76; Beddome clxxii.; Brandis 366; Gamble 61. Vern. *Gineri*, Nep.; *Michapgong*, Lepcha; *Dauli*, Rajbanshi; *Pedda-nella-kura*, Tel.; *Gondhona*, Uriya; *Middi*, Cingh.

A small deciduous tree with greyish white bark. Wood grey with yellow, green, and purple streaks. Annual rings marked by a faint line. Pores between small and moderate-sized, often oval and subdivided. Medullary rays numerous, uniform, equidistant, moderately broad, marked on a radial section. Distinguished from *P. tomentosa* by softer wood, by the medullary rays being closer together, and by smaller pores.

Sub-Himalayan tract from Kumaun eastwards, South India.

Growth moderate, 4 to 9 rings per inch of radius. Weight 38 to 43 lbs. per cubic foot. Used to obtain fire by the hill tribes of Sikkim. The leaves are said by Beddome to be eaten in curries: they are sometimes given as fodder to cattle.

		lbs.
E 621.	Rakti Forest, Darjeeling Terai	38
E 2399.	Bamunpokri, " "	43

4. P. integrifolia, Linn , Brandis 366, Gamble 60 *P serratifolia,* Linn , Roxb Fl Ind iii 77, Beddome clxxii , Kurz ii 262 Vern *Bakiucha,* Garhwal, *Ganniari,* Oudh, *Bhut bhirau,* Beng , *Gineri,* Nep , *Munnay,* Tam., *Ghebu nelli, pinna-nelli,* Tel , *Chamari,* Mar , *Appel,* Mal

A small deciduous tree, the stem and branches often armed with stout woody spines Wood white with purple streaks, moderately hard, close-grained, structure similar to that of *P latifolia,* from which it is probably not specifically distinct

Oudh Northern Bengal South India Ceylon Tenasserim and the Andaman Islands Weight 35 lbs per cubic foot The wood is used for firewood the leaves for feeding cattle The fresh felled wood exudes a green coloured sap

		lbs
O 3082	Gonda Oudh	35
O 3092	Kheri	

5 P mucronata, Roxb Fl Ind iii 80, Brandis 366, Gamble 61, Vern , *Bankhai, gian,* Pb , *Bakar, bakarcha, basóta, agniun, tumari, ghatela,* Hind , *Agniu,* Kumaun

A small tree with grey bark Wood moderately hard, light purple, structure the same as that of *P integrifolia*

Sub Himalayan tract from the Chenab eastwards Wood a good fuel, used to obtain fire by friction

O 3091 Kheri Oudh

4 GMELINA, Linn.

Contains 3 species *G asiatica* Linn Roxb Fl Ind iii 87 Beddome clxxii , Brandis 365 Kurz ii 265 Vern *Gumudi* Tel is a large branching shrub or small tree of swamp forests in South India Burma and Ceylon *G Hystrix,* Schult , Kurz ii 265 is a large scandent shrub or Tenasserim

1 G arborea, Roxb Fl Ind iii 84, Beddome t 253, Brandis 364, Kurz ii 264, Gamble 61 Vern *Gumhar, khammara, kambhar, kumár, gambari, sewan, shewan,* Hind , *Gumar, gumbar,* Beng , *Gambari,* Nep , Uriya, *Gomari,* Ass , *Numbor,* Lepcha, *Gumai,* Cachar, *Bolkobal,* Garo, *Gumadi, cummi,* Tam , *Gumar tek pe l lagomru, tagumuda, gumudu,* Tel , *Shewney, kuli,* Kan , *Shewan,* Mar , *Chimman, sag,* Bhil , *Kumbulu,* Mal , *Kurse,* Gondi, *Kassamar,* Kurku, *Al deminata,* Cingh , *Ramani,* Magh, *Yamaney,* Burm

A moderate sized or large deciduous tree Bark ¼ inch thick, smooth, white or whitish grey Wood yellowish, greyish or reddish white, with a glossy lustre, close and even grained, soft, light and strong, durable, does not warp or crack Annual rings marked either by a white line or by more numerous pores in the spring wood Pores large and moderate sized, often subdivided, rather prominent on a vertical section Medullary rays short, moderately broad, prominent, visible on a radial section as irregular horizontal bands, giving the wood a mottled appearance

Sub Himalayan tract from the Chenab eastwards and throughout India Burma and the Andaman Islands

ralling a small round
l un ter of 10½ inches or
.7 rings with a diameter

of 14 inches or nearly 4 rings per inch. The weight and transverse strength have been determined by the following experiments:—

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"	"	" . .	28	4	6 × 2 × 2	398
"	"	Junagarh . .	50? wet	4	7 × 2 × 2	324
Brandis, No. 87 . .	1862	Burma . .	35	...	...	...
Warth	1878	as below	36	18	...	...

The wood is easily worked and readily takes paint or varnish; it is very durable under water. It is highly esteemed for planking, furniture, door panels, carriages and palanquins, well-work, boats, toys, packing cases and all ornamental work; it is used in Burma for carving images, clogs and canoes. It would probably be a valuable wood for tea-boxes. It is the chief furniture wood of Chittagong and is in some demand in Calcutta. Writing in May 1829, in 'Gleanings in Science,' Captain Baker, the Superintendent of Suspension Chain Bridges, spoke of *Gumbhar* wood as "well calculated for light planking, panelling, blinds and venetians, and of much estimation for picture frames, organ pipes, sounding boards and other such work where shrinkage is to be avoided," so that it has evidently been long known in the Calcutta market. The fruit is eaten by Gonds, and, as well as the bark and root, is used in native medicine. It is now being planted at Sitapahar and Jamguri in Bengal, and, if not eaten down by deer who are very fond of it, it grows very fast. Seedlings in the Jamguri Nursery, Buxa Reserve, in 1879 reached a height of nearly 4 feet in 6 months.

			lbs.
O	325.	Garhwal (1868)	33
O	343.	Gorakhpur (1868)	32
O	1372.	Gonda, Oudh	40
O	1457.	Bahraich, Oudh	38
O	1483.	Kheri, Oudh	39
C	182.	Mandla, Central Provinces (1870)	35
C	1129.	Ahiri Reserve, Central Provinces	...
C	835.	Bairagarh Reserve, Berar	45
C	2775.	Melghát, Berar	38
C	959.	Guzerat, Bombay	34
E	676.	Bamunpokri, Darjeeling Terai	41
E	2396.	Sivoke Forest, " "	35
E	948.	Eastern Dúars, Assam	36
E	2193.	Nowgong, Assam	39
E	2303.	Kámrúp, "	37
E	1435.	Assam	31
E	1390.	Chittagong	33
B	295.	Burma (1867)	28
B	1425.	Tharrawaddy, Burma	35

5. VITEX, Linn.

Contains 10 to 12 species of Indian trees. *V. trifolia*, Linn.; Roxb. Fl. Ind. iii. 69; Beddome clxxii.; Brandis 370; Gamble 61 (*V. Agnus-castus*, Linn.; Kurz ii. 269) Vern. *Nishinda*, Hind.; *Pajpati*, Nep.; *Nir-nochi*, Tam.; *Vavili*, Tel.; *Karanuchi*, Kan., is a small tree or shrub of Bengal, South India and Burma. *V. heterophylla*, Roxb. Fl. Ind. iii. 75; Kurz ii. 270; Gamble 61. Vern. *Neri*, Nep.; *Murkut*, Lepcha, is a large tree of Northern and Eastern Bengal and Burma. *V. canescens*, and *V. limonifolia*, Kurz ii. 270, 271, are deciduous trees of the forests of Prome. *V. Wimberleyi*, Kurz ii. 271, is a small evergreen tree of the Andaman Islands.

Wood between 40 and 55 lbs in weight, hard, close grained Annual rings distinct Pores small or moderate sized Medullary rays fine, uniform, numerous, equidistant

1 V **Negundo,** Linn , Roxb Fl Ind iii 70, Beddome clxxi Brandis 369 Vern *Marwan, moraun, mauna mora wana, banna, torban, biuna*, Pb , *Shiwari, shawali, nengar, mewri, nisi da*, Hind , *Beyguna*, Uriya, *Nirgunda, nirgur*, Mar , *Ni gun* Gondi *Nirgudi*, Kuku, *Vella nuchi*, Tam , *Veyala*, Tel , *Lakki*, Kan *Si lu nika*, Cingh

A deciduous shrub, with thin grey bark Wood greyish white, hard Annual rings marked by a narrow belt of more numerous and larger pores at the inner edge Pores small and moderate sized Medullary rays numerous fine, uniform, equidistant

Common in the drier parts of India and ascending to 5 000 feet in the North West Himalaya

Growth moderate 7 rings per inch of radius Weight 41 to 42 lbs per cubic foot The branches are used for wattle work the root is employed as a febrifuge and the leaves to cure headache

		lbs
H 3044	Kumharsen Sutlej Valley	42
C 2789	Melghat Berar	41

2 V. **altissima,** Linn , Roxb Fl Ind iii 71, Beddome t 252, Brandis 370, Gamble 61 Vern *Ahay*, Ass , *Maila*, Tam , *Myrole, balgay, nauladi, sampaga pala*, Kan , *Banalgay*, Mar , *Milila*, Cingh

A large tree Bark $\frac{1}{3}$ inch thick, grey, fibrous Wood grey with a tinge of olive brown, hard, close grained, polishes well Annual rings distinctly marked by a belt of firmer wood on the outer edge Pores small, scanty Medullary rays fine, numerous, wavy

Bengal South India and Ceylon

Growth moderate 8 to 9 rings per inch of radius Weight 50 to 53 lbs per cubic foot (South Kanara specimens) 49 and 56 lt
Skinner No 145 gives 63 lbs for Kanara
Skinner P = 557 Molesworth in Graphic
gives Weight 56 lbs P = 722 E = 4700
carts and deserves attention

		lbs
W 724	South Kanara	53
W 757		50
Nos 54 (56 lbs) and 78 (49 lbs) Ceylon Collection		

3 V **pubescens,** Vahl , Beddome clxxi , Kurz ii 271 *V arborea*, Roxb Fl Ind iii 73 Vern *Nowli eragu, busi*, Tel , *Myladi*, Tam , *Kyet yoh*, Burm

A large tree Wood smooth, grey with an olive-brown tinge, very hard, close-grained Annual rings marked by a more or less sharp line and by a broad belt of firmer wood on the outer edge Pores small, uniformly distributed Medullary rays fine and very fine, numerous, equidistant, the distance between the rays equal to the transverse diameter of the pores

South India Burma and the Andaman Islands

Growth moderate 8 to 10 rings per cubic foot Weight according to Brandis Burma List of 1862, No 83 45 lbs, but his specimen now weighs 51 lbs,

of 14 inches or nearly 4 rings per inch. The weight and transverse strength have been determined by the following experiments :—

Experiment by whom made.	Year.	Wood whence procured.	Weight.	Number of experiments.	Size of bar. Ft. In. In.	Value of P.
Wallich	...	India	32	...	...	...
K[illegible]	1831	Assam	38	...	2 × 1 × 1	675
[illegible]	1829	Bengal	29	3	7 × 2 × 2	375
[illegible]	"	"	28	4	6 × 2 × 2	398
[illegible]	"	Junagarh	50? wet	4	7 × 2 × 2	324
[illegible]	1862	Burma	35	...	...	...
[illegible]	1878	as below	36	18	...	...

4. V[illegible]
Wall. in DC[illegible]
Krawru, Magh[illegible]
A tree. Ba[illegible]
close-grained. A[illegible]y worked and readily takes paint or varnish; it is very durable
small, moderate-siz[illegible]ghly esteemed for planking, furniture, door panels, carriages
Medullary rays fine, very boats, toys, packing cases and all ornamental work; it
images, clogs and canoes. It would probably be a
Assam, Chittagong and Burma.
Growth moderate, 6 to 8 rings per in[illegible] the chief furniture wood of Chittagong and is
Used in Cachar for posts and beams, in the Ga[illegible] 1829, in 'Gleanings in Science,' Captain
Bridges, spoke of *Gumbhar* wood as
E 784. Kámrúp, Assam . . . . . . venetians, and of much esti-
E 1393. Chittagong . . . . other such work where
B 1423. Tharrawaddi, Burma . . . . in the Calcutta

5. V. leucoxylon, Linn. f.; Roxb. Fl. Ind. iii. 74; Beddome clxxi. ; Brandis 370; Kurz ii. 273. *V. saligna,* Roxb. l. c. 75. Vern. *Goda, horina, ashwal,* Beng.; *Luki, neva-ledi,* Tel.; *Sengeni, karril,* Kan.; *Tokra,* Magh; *Longarbi thiras,* Mar.; *Htouksha,* Burm.

A very large deciduous tree. Wood grey with a satiny lustre, hard, close-grained, durable. Annual rings marked by a prominent line. Pores small, often oval and subdivided, numerous. Medullary rays short, moderately broad and broad, marked as long shining bands on a radial section.

Chittagong, Burma, Andaman Islands and South India.

Growth moderate to fast, 3 to 12 rings per inch of radius, averaging 6 rings. The following experiments have been made to determine the weight and transverse strength :—

	Weight.	P.
1831, Kyd, with Assam wood, bars 2′ × 1″ × 1″ . .	40	337
1864, Brandis, " Burma " " 3′ × 1″ × 1″ . .	39	763
" " " " " " 2′ × 1″ × 1″ . .	39	508
1878, Warth, with Chittagong and Burma wood (below) . .	41	...
1862, Brandis, with Burma wood, No. 84	42	...

The wood is used for cart-wheels, and deserves attention for furniture and other purposes. The fruit is eaten by Burmese in the Andamans, and the bark and root used as an astringent (Major Ford).

		lbs.
E 1392.	Chittagong	45
B 330.	Burma (1867)	40
B 2549.	" (1862)	40
B 2711.	Tavoy (Wallich, 1828)	36
B 2218.	Andaman Islands (1866)	44

6. CLERODENDRON, Linn.

Contains about 12 to 18 species of Indian shrubs or small trees. *C. phlomoides,* Linn.; Roxb. Fl. Ind. iii. 57; Beddome clxxxiv.; Brandis 363. Vern. *Urni,* Hind.; *Irun, arni,* Guz.; *Telaki,* Tel., is a tall white-flowered shrub of the arid and northern

Wood between 40 and 55 lbs. in weight, hard, close-grained. Annual rings distinct. Pores small or moderate-sized. Medullary rays fine, uniform, numerous, equidistant.

1. V. Negundo, Linn.; Roxb. Fl. Ind. iii. 70; Beddome clxxi. Brandis 369. Vern *Marwan, moráun, máura, mora, wina, banna, torban, biuna*, Pb.; *Shiwari, shawáli, nengar, mewri, nisinda*, Hind, *Beygúnça*; Uriya; *Nirgunda, nirgúr*, Mar; *Nurgiri*, Gondi, *Nirgudi*, Kurangi, *Vella nuchi*, Tam.; *Veyala*, Tel; *Lakki*, Kan, *Sudú nika*, Cingh a shrub

A deciduous shrub, with thin grey bark. Wood greyish w eastwards, Brandis 364; Annual rings marked by a narrow belt of more numer *Barangi*, Hind; pores at the inner edge Pores small and moderate-size and blue berries, rays numerous fine, uniform, equidistant tied round the neck , in the Sundarbans.

Common in the drier parts of India, and ascending to 5,*ta*, Nep, *Tongsor*, Lepcha, Himalaya orthern and Eastern Bengal.

Growth moderate, 7 rings per inch of radius, Nep, *Kadung*, Lepcha, is a small foot The branches are used for wattle w; Kurz ii 268, is an evergreen shrub of the and the leaves to cure headache. ed toungyas.

H 3041 Kumharsen aum, Walp.; Gamble 62. Vern. *Kadungbi*,
C 2789 Melgh

an evergreen tree with silvery grey bark. Wood grey, soft. Pores large and moderate-sized, often subdivided, the large pores arranged in interrupted concentric lines, and all pores, especially the smaller ones, joined by irregular concentric bands of softer tissue. Medullary rays moderately broad and fine, irregularly distributed.

Sikkim and Khasia Hills, 3,000 to 6,000 feet

Weight, 29 lbs per cubic foot The whole plant has a strong disagreeable smell; the young leaves are eaten by Lepchas.

		lbs
E 2401.	Tukdah Forest, Darjeeling, 5,000 feet . . .	29

7. CARYOPTERIS, Bunge.

1. C. Wallichiana, Schauer; Brandis 370; Gamble 62. Vern. *Moni, moháni*, Kumaun; *Shechin*, Nep; *Malet*, Lepcha.

A large shrub with thin grey papery bark, peeling off in vertical strips. Wood dark grey, moderately hard, with the scent of cherry wood. Pores very small, often in groups, uniformly distributed. Medullary rays moderately broad, the distance between them much greater than the transverse diameter of the pores.

Outer Himalaya, from the Indus to Bhutan, ascending to 3,000 feet.

Growth rapid, 5 rings per inch of radius. Weight, 44 lbs per cubic foot Has handsome lilac flowers.

		lbs
E 2402.	Chunbati, Darjeeling, 2,000 feet	44

8. AVICENNIA, Linn.

1. A. officinalis, Linn.; Beddome clxxiv.; Brandis 371; Kurz ii. 275. Vern. *Bani*, Beng.; *Mada, nalla mada*, Tel.; *Thamé*, Burm.

A shrub or small tree Wood grey, with a darker heartwood, hard, heavy, consisting of numerous, narrow, well-marked, concentric layers; the inner portion of each layer is firm, with moderate-sized pores which

are often in short radial or oblique lines; the outer irregular narrower portion of each layer consists of soft tissue, with a few larger pores. Medullary rays fine, numerous, prominent in the inner layer of each ring.

Salt marshes, coast and tidal forests of India, Burma, and the Andaman Islands.

Weight, 58 lbs. per cubic foot. Wood very brittle, used only for firewood. Major Ford says it is used for mills for husking paddy, rice-pounders, and oil-mills in the Andamans.

		lbs.
E 398.	Sundarbans	58
B 2284.	Andaman Islands	58

ORDER LXXXI. LABIATÆ.

Contains a large number of herbaceous genera, a few only reaching the size of small shrubs or trees. There are about 7 Indian genera with woody species belonging to 5 tribes:—

Tribe I.—Ocimoideæ	*Plectranthus.*
„ II.—Satureineæ	*Colebrookia* and *Elsholtzia.*
„ III.—Monardeæ	*Meriandra.*
„ IV.—Stachydeæ	*Colquhounia* and *Roylea.*
„ V.—Ajugoideæ	*Teucrium.*

Colquhounia elegans, Wall.; Kurz ii. 278, is a scandent shrub of the hill forests of Martaban at 4,000 to 5,000 feet. *C. coccinea,* Wall., and *C. vestita,* Wall., are scandent shrubs of Nepal and the Eastern Himalaya.

Wood light-coloured, hard. Pores small or very small, generally in groups. Medullary rays moderately broad, distant.

1. PLECTRANTHUS, L'Hér.

1. P. rugosus, Wall. Vern. *Khwangere,* Trans-Indus; *Itsit,* Salt Range; *Búi,* Jhelam; *Solei,* Kashmir; *Piúmar, chúgú,* Chenab; *Kot, siringri,* Ravi; *Pek, rosbang, chichri,* Sutlej.

A small shrub with brown bark. Wood grey, hard. Pores small and very small. Medullary rays moderately broad. Annual rings marked by a narrow belt of more numerous pores.

Common on dry hill-sides and rocks in the North-West Himalaya and Salt Range above 3,000 feet.

H 2840. Simla, 7,000 feet.

2. COLEBROOKIA, Sm.

C. ternifolia, Roxb., is a shrub of the hills of the Carnatic.

1. C. oppositifolia, Sm.; Kurz ii. 277; Gamble 63. Vern. *Shakardana,* Trans-Indus; *Phis bekkar,* Salt Range; *Dúss, sampni,* Jhelam; *Súáli,* Chenab; *Dúss,* Ravi; *Briali, basuti,* Beas; *Barmera,* Sutlej; *Dulskat,* Kumaun; *Dosúl,* Nep.

A shrub with grey bark. Wood greyish white, moderately hard, close-grained. Pores very small, in groups. Medullary rays moderately broad; the distance between the rays several times larger than the transverse diameter of the pores.

Outer Himalaya, from the Indus to Bhutan, ascending to 4,000 feet
Weight, 46 lbs per cubic foot The wood is used for gunpowder charcoal, and the leaves applied to wounds and sores (*Stewart*)

		lbs
H 3046	Below Komharsen, Sutlej Valley, 2,500 feet . .	46

3 ELSCHOLTZIA, Willd

1. E. polystachya, Benth. Vern. *Rangchari, mehndi*, Jhelam; *Garúdar, tappaddar*, Chenab; *Dúss*, Ravi, *Pothi*, Sutlej, *Bhangria*, Kumaun.

... nal strips. Wo... separates into ... a belt of numerous and larger pores in the spring wood Pores small and very small, often subdivided, those in the outer belt of the annual ring arranged in groups. Medullary rays moderately broad, the distance between the rays larger than the transverse diameter of the pores.

North-Western Himalaya, from the Jhelam eastwards, and the Khasia Hills, from 6,000 to 10,000 feet
Growth slow, 15 rings per inch of radius Weight, 42 lbs per cubic foot Common in forest undergrowth, growing often to 10 or 12 feet high

		lbs.
H 2841 H 2936	} Mahasu, Simla, 7,000 feet	42

4. MERIANDRA, Benth.

M. bengalensis, Bth, is often cultivated in Indian gardens as a substitute for sage.

1. M. strobilifera, Benth.
A small shrub with grey bark. Wood white, hard. Pores small and very small. Medullary rays fine, numerous. Annual rings marked by an interrupted line of larger pores on the inner edge, and a narrow belt of firmer wood on the outer edge of each ring.

... scent of sage, they are distinguished ... g sagittate. The shrub is chiefly found ...

H 2839 Simla, 6,500 feet

5. ROYLEA, Wall.

1. R. elegans, Wall. Vern. *Kaur, kauri*, Pb.; *Titpáti*, Kumaun; *Patkarru*, Hind
A shrub with grey bark. Wood white, hard. Pores small and very small, in groups and short tails. Medullary rays moderately broad, unequally distributed.

North-West Himalaya, from the Ravi to Nepal, up to 3,000 feet.
A handsome shrub. Weight, 52 lbs per cubic foot.

		lbs.
H 3045.	Komharsen, Sutlej Valley, 4,000 feet	52

are often in short radial or oblique lines; the outer irregular narrower portion of each layer consists of soft tissue, with a few larger pores. Medullary rays fine, numerous, prominent in the inner layer of each ring.

Salt marshes, coast and tidal forests of India, Burma, and the Andaman Islands.

Weight, 58 lbs. per cubic foot. Wood very brittle, used only for firewood. Major Ford says it is used for mills for husking paddy, rice-pounders, and oil-mills in the Andamans.

		lbs.
E 398.	Sundarbans	58
B 2284.	Andaman Islands	58

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„ IV.—Stachydeæ	*Colquhounia* and *Roylea.*
„ V.—Ajugoideæ	*Teucrium.*

Colquhounia elegans, Wall.; Kurz ii. 278, is a scandent shrub of the hill forests of Martaban at 4,000 to 5,000 feet. *C. coccinea*, Wall., and *C. vestita*, Wall., are scandent shrubs of Nepal and the Eastern Himalaya.

Wood light-coloured, hard. Pores small or very small, generally in groups. Medullary rays moderately broad, distant.

1. PLECTRANTHUS, L'Hér.

1. P. rugosus, Wall. Vern. *Khwangere,* Trans-Indus; *Itsit,* Salt Range; *Búi,* Jhelam; *Solei,* Kashmir; *Piúmar, chúgú,* Chenab; *Kot, siringri,* Ravi; *Pek, rosbang, chichri,* Sutlej.

A small shrub with brown bark. Wood grey, hard. Pores small and very small. Medullary rays moderately broad. Annual rings marked by a narrow belt of more numerous pores.

Common on dry hill-sides and rocks in the North-West Himalaya and Salt Range above 3,000 feet.

H 2840. Simla, 7,000 feet.

2. COLEBROOKIA, Sm.

C. ternifolia, Roxb., is a shrub of the hills of the Carnatic.

1. C. oppositifolia, Sm.; Kurz ii. 277; Gamble 63. Vern. *Shakardana,* Trans-Indus; *Phis bekkar,* Salt Range; *Dúss, sampni,* Jhelam; *Súáli,* Chenab; *Dúss,* Ravi; *Briali, basuti,* Beas; *Barmera,* Sutlej; *Dulshat,* Kumaun; *Dosúl,* Nep.

A shrub with grey bark. Wood greyish white, moderately hard, close-grained. Pores very small, in groups. Medullary rays moderately broad; the distance between the rays several times larger than the transverse diameter of the pores.

n, ascending to 4 000 feet
is used for gunpowder charcoal and the

		lbs
H 3016	Below Komharsen Sutlej Valley 2 500 feet	46

3 ELSCHOLTZIA, Willd

1. E polystachya, Benth Vern *Rangchari, mehudi,* Jhelam, *Garudar, tappaddar,* Chenab, *Duss,* Ravi, *Pothi,* Sutlej, *Bhangria,* Kumaun

A shrub with grey, fibrous bark, peeling off in thin, longitudinal strips Wood grey, moderately hard, splits and cracks, and in seasoning separates into concentric masses Annual rings distinctly marked by a belt of numerous and larger pores in the spring wood Pores small and very small, often subdivided, those in the outer belt of the annual ring arranged in groups Medullary rays moderately broad, the distance between the rays larger than the transverse diameter of the pores

North Western Himalaya from the Jhelam eastwards and the Khasia Hills from 6 000 to 10 000 feet
Growth slow, 15 rings per inch of radius Weight 42 lbs per cubic foot
Common in forest undergrowth, growing often to 10 or 12 feet high

		lbs
H 2841 H 2936	Mahasu, Simla 7 000 feet	42

4 MERIANDRA, Benth

M bengalensis Bth is often cultivated in Indian gardens as a substitute for sage

1. M. strobilifera, Benth

A small shrub with grey bark Wood white, hard Pores small and very small Medullary rays fine, numerous Annual rings marked by an interrupted line of larger pores on the inner edge, and a narrow belt of firmer wood on the outer edge of each ring

North West H ... 6 000 f ...
he scent of sage they are distinguished
eing sagittate The shrub is chiefly found
on dry rocks especially limestone

H 2839 Simla 6 500 feet

5. ROYLEA, Wall

1 R elegans, Wall Vern *Kaur, kauri,* Pb, *Titpati,* Kumaun, *Patkarru,* Hind

A shrub with grey bark Wood white, hard Pores small and very small, in groups and short tails Medullary rays moderately broad, unequally distributed

North West Himalaya from the Ravi to Nepal up to 3 000 feet.
A handsome shrub Weight 52 lbs per cubic foot

		lbs.
H 3045	Komharsen Sutlej Valley, 4 000 feet.	52

6. TEUCRIUM, Linn.

1. T. macrostachyum, Wall.; Gamble 62. Vern. *Matsola, gurupis,* Nep.; *Chúng,* Lepcha.

A small evergreen tree. Bark thin, corky. Wood yellowish white, moderately hard, close and even-grained. Pores small, in groups. Medullary rays moderately broad, numerous. Annual rings indistinctly marked.

Eastern Himalaya from Nepal eastwards, Khasia Hills and Sylhet, from 5,000 to 8,000 feet.

Growth rapid, 3 to 5 rings per inch of radius. Weight, 38 to 41 lbs. per cubic foot. A common tree in second growth forests in the Sikkim Hills, and easily recognised by its greyish foliage and long erect spikes of dirty white flowers with long-exserted stamens. Its wood is a fair fuel. It coppices well and strikes easily from cuttings.

		lbs.
E 2411.	Rangbúl, Darjeeling, 7,000 feet	41
E 3376.	Darjeeling, 6,500 feet.	38

Order LXXXIII. NYCTAGINEÆ.

Contains one genus of Indian trees—*Pisonia aculeata,* Linn.; Beddome clxxv.; Kurz ii. 279, is a large straggling climber of Southern India and of the coast forests of Burma and the Andaman Islands. *P. alba,* Span, and *P. umbellifera,* Seem.; Kurz ii. 279, 280, are evergreen trees of the coast forests of the Andamans. To this family belong the beautiful *Bougainvilleas,* common in gardens, and the Marvel of Peru, *Mirabilis Jalapa,* cultivated or run wild over the greater part of India.

Order LXXXIV. AMARANTACEÆ.

A large genus of herbaceous plants containing only 2 or 3 genera of Indian shrubs. *Deeringia baccata,* Moq.; Gamble 63 (*D. celosioides,* R. Br.; Roxb. Fl. Ind. i. 682) Vern. *Gola mohani,* Beng.; *Kala lodri,* Kumaun; *Latman,* Hind., is a common climber of Northern India, climbing over bushes and covering them in the cold season with its long branches covered with bright crimson berries.

1. RODETIA, Moquin-Tandon.

1. R. amherstiana, Moq. *Deeringia Amherstiana,* Wall. Vern. *Bilga,* Koti.

A large straggling shrub, with thin, brown, rough bark. Wood grey, soft, divided by concentric and anastomosing bands of cellular tissue into irregular, narrow, concentric belts, which are subdivided into oblong porous areas by short medullary rays varying in breadth, which often gradually widen where they join the concentric bands of cellular tissue. Pores moderate-sized, numerous.

North-west Himalaya and Burma.

Weight, our specimen gives 41 lbs. per cubic foot. It seems to be often grown as a hedge; the young shoots are eaten fried in ghee, and a black dye is obtained from the leaves. The berries, which are bright crimson, resembling those of *Deeringia,* are also eaten.

		lbs.
H 3097.	Koti, near Simla, 6,000 feet	41

Order LXXXV. POLYGONEÆ.

A large Order of herbaceous plants, containing only 3 genera which have woody plants indigenous in India, *viz*, *Calligonum*, *Polygonum* and *Rumex*

1. CALLIGONUM, Linn.

1. C ndis 372. Vern. *Balanja, berwaja, tatúke,*

A slow-growing shrub. Bark reddish grey, rough, peeling off in long thin flakes, inner substance red. Most old stems are hollow. Heartwood reddish brown, very hard Annual rings distinctly marked by a continuous belt of moderate-sized and large pores; in the outer portion of each annual ring the pores are small, in groups, scanty, often joined by wavy lines of soft tissue. Medullary rays fine, numerous.

Arid zone of Sind, the Punjab and Rajputana, Afghanistan and Western Asia.
It is chiefly used for fuel, but twigs and branches are sometimes employed for the walls and roofs of huts The abortive flowers are swept up and eaten, either made into bread or cooked with ghee

P 889. Multán.

2. POLYGONUM, Linn.

Contains several shrubs of the Himalaya, some with very handsome flowers, but none of any importance, except the one described Besides the shrubs there are a large number of herbaceous plants belonging to this genus, many of them very common.

1. P. molle, Don; Gamble 63 Vern *Totnye, tuknu, patu-swa,* Nep.
A large trailing shrub, with thin, dark grey bark and hollow stems. Wood reddish white Annual rings marked by a belt of moderate-sized pores; in the outer portion of each ring the pores are small, scanty, often in groups. Medullary rays moderately broad, often in pairs, irregularly distributed.

Hills of Sikkim and Bhutan, from 5,000 to 8,000 feet
An extremely com
The young shoots are
doubt about the name
Ham, in Don Prodr Fl Nep 74 It has the enlarged succulent calyx of *Coccoloba* round the fruit

E 2412 Rangbi, Darjeeling, 5,000 feet

3. RUMEX, Linn.

1. R. hastatus, Don. Vern. *Katambal, khattimal,* Jhelam; *Ami,* Chenab, Ravi; *Malorigha, amla,* Beas; *Amlora,* Sutlej, *Almora,* Kumaun.
Generally an undershrub, sometimes a shrub. Wood light red, moderately hard. Pores small, more numerous at the inner of the annual rings. Medullary rays broad and very broad.

North West Himalaya from 2,500 to 9,000 feet, chiefly on
The leaves are acid and are eaten as sorrel.

H 3018. Kot, Sutlej Valley, 2,500 feet.

Atraphaxis spinosa, Linn, Brandis 373, is a thorny shrub
istan and Beluchistan belonging to this family.

ORDER LXXXV. LAURACEÆ.

A large Order containing 17 genera of Indian trees, many of which are important. These genera belong to 4 tribes, *viz.*—

Tribe I.—Perseaceæ	*Cinnamomum, Alseodaphne, Phœbe, Machilus, Haasia, Beilschmiedia* and *Apollonias.*
„ II.—Cryptocaryeæ . . .	*Cryptocarya.*
„ III.—Litsæaceæ	*Tetranthera, Cylicodaphne, Dodecadenia, Actinodaphne, Litsæa, Daphnidium, Aperula* and *Lindera.*
„ IV.—Hernandieæ . . .	*Hernandia.*

Nectandra and *Sassafras* belong to the Sub-Order Oreodaphneæ, *Persea* to Perseaceæ and *Laurus* to Litsæaceæ. The identification of many of the species of the Order is very difficult, and few Orders more require further and careful investigation.

Haasia Wightii, Nees; Beddome t. 298, is a tree of the Anamalai Hills and the Ghâts of Tinnevelly and Travancore. *Apollonias Arnottii*, Nees; Beddome t. 291; Brandis 377, is a tree of the Tinnevelly and Travancore Ghâts and Malabar.

Cryptocarya contains about 6 species. *C. Wightiana*, Thw.; Beddome t. 299, is a large tree of the Western Ghâts and Ceylon. *C. Stocksii*, Meissn., is a tree of Kanara; and *C. Neilgherrensis*, Meissn., of the Nilgiri Hills. *C. floribunda*, Nees, and *C. amygdalina*, Nees; Gamble 64. Vern. *Patmaro*, Nep.; *Kaledzo*, Lepcha, are trees of the outer Sikkim Himalaya and Eastern Bengal. *C. ferrea*, Bl.; and *C. Griffithiana*, Wight; Kurz ii. 295, are trees of Tenasserim.

Cylicodaphne contains about 8 species placed by Beddome and Kurz under *Tetranthera*, but separated by Meissner in DC. Prodromus, Vol. XV. *C. nitida*, Meissn. (*Tetranthera nitida*, Roxb.; Kurz ii. 302. Vern. *Kotoloah* Ass.) is a large tree of Eastern Bengal and Burma upon whose leaves the "Muga" silkworm (*Antheræa Assama*) is sometimes fed. *C. Wightiana*, Nees, is a tree of Assam, South India and Ceylon. *Dodecadenia grandiflora*, Nees; Brandis 381; Kurz ii. 304, is an evergreen tree of the Himalaya from Kumaun eastwards. *Actinodaphne* contains about 9 species. *A. angustifolia*, Nees; Beddome clxxxvi.; Brandis 381 (*Litsæa angustifolia*); Kurz ii. 305. Vern. *Samkoh*, Ass., *Boltanaro*, Gáro; *Tabongdeing*, Magh, is a large evergreen tree of Eastern Bengal, South India and Burma. *A. salicina*, DC.; Beddome t. 295, Kurz ii. 305, is a tree of the Western Ghâts and Ceylon. *A. Hookeri*, Meissn.; Beddome t. 296; Brandis 381, is a small tree of Sikkim and the Eastern and Western Ghâts of South India. *A. obovata*, Hook. f. and Th.; Gamble 65. Vern. *Muslindi*, Nep.; *Pohor*, Lepcha; *Laiphanzeh*, Mechi; *Cherritinga*, Ass., is a large evergreen tree of the outer Sikkim Himalaya, Assam, Khasia Hills and Sylhet, with large 3-nerved leaves, generally in whorls. *Aperula* contains 2 trees: *A. assamica*, Meissn. (*Lindera assamica*, Kurz ii. 308), of Sikkim, Assam and the Martaban Hills; and *A. Neesiana*, Bl.; Brandis 383. (*Lindera Neesiana*, Kurz ii. 309) Vern. *Karaway*, Burm., of Nepal, Sikkim and Burma, yielding, according to Kurz, excellent sassafras. *Lindera* contains about 5 species, chiefly of Sikkim and Bhutan, the chief among which is *L. heterophylla*, Meissn., of the hills of Sikkim at 8,900 to 9,000 feet. *Hernandia peltata*, Meissn.; Beddome t. 300; Kurz ii. 309. Vern. *Uparanthi* Mysore; *Palati*, Cingh., is an evergreen tree with peltate leaves found in the coast forests of the Andamans and Ceylon. Beddome says that the wood is very light and takes fire readily, that the juice is a powerful depilatory, removing the hair without pain, and that the seed and young leaves are cathartic. *Persea gratissima* is the fruit tree, the Avocado Pear, cultivated in India. The bay laurel is *Laurus nobilis*.

The wood of the Indian laurels is generally light-coloured, soft or moderately hard, without heartwood, even-grained, seasoning well without splitting. They have, with few exceptions, an exceedingly uniform structure. Pores small or moderate-sized, uniformly distributed. Medullary rays fine, uniform and equidistant. Annual rings distinctly

marked in most species either by a sharp line, or by a firmer belt of wood in the outer portion of the ring.

1. CINNAMOMUM, Burman.

According to Meissner this genus contains 16 Indian species, 5 of which from ... It contains 2 ... ally with penni... sn, Beddome t... Kurz ii. 288, is a ... sserim. *C. iners*, ... tree of Eastern ... tree *C. im-audatum*, Nees, ... a round leaved ... reyn., Beddome ... *arruwa*, Tam.; ...

camphor is obtained.

Wood soft, seasons well, and does not warp or crack. Pores well marked on a longitudinal section. Medullary rays uniform and equidistant. The leaves and bark, as well as the wood of many species, are aromatic.

1. C. ... dis 375, Kurz ii. 287; Gamble 63. ... l. ii. 302. Vern. *Tezpat, ramtezpat*, ... *Nupsor*, Lepcha; *Patichanda*, Ass.; *Loolengkyau*, Burm.

An evergreen tree, with grey aromatic bark ¼ inch thick. Wood reddish grey, moderately hard, shining, mottled on a vertical section by the medullary rays, the pores containing a gummy substance which exudes copiously on the wood being wetted. Annual rings very indistinctly marked. Pores moderate-sized, often subdivided, uniformly distributed in frequently grouped oblique lines. Medullary rays moderately broad, slightly undulating, prominent on a radial section as long narrow plates. The wood has a kind of lustre, and the bark of the roots is highly aromatic.

Outer North East Himalaya to 7,000 feet, Eastern Bengal, Burma, and Andaman Islands ... tree ... dius ... that ... *uma*) sometimes feeds on its leaves

		lbs
E 498	Sukna Forest, Darjeeling Terai	44
E 693	Sepoydura Forest, Darjeeling, 5 500 feet	38

2. C. pauciflorum, Nees. Vern. *Dinglatterdop*, Khasia

Wood light red, very aromatic, beautifully mottled on a radial section by the medullary rays, rough, hard. Pores moderate-sized, often in radial lines. Medullary rays moderately broad, numerous.

Assam Valley, Khasia Hills and Sylhet. Weight, 39 lbs. per cubic foot. Growth fast, 4 rings per inch of radius.

		lbs.
E 798.	Khasia Hills, 5,000 feet	39

3. C. Tamala, Nees; Brandis 374; Gamble 63. *C. albiflorum*, Nees; Wight Ic. t. 140. *C. Cassia*, Bl.; Kurz ii. 288. *Laurus Cassia*, Roxb. Fl. Ind. ii. 297. Cassia Cinnamon. Vern. *Dálchíni*, *kirkiria*; *kikra*, *sinkami*, *silkanti*, Hind.; *Chota sinkoli*, Nep.; *Nupsor*, Lepcha; *Dopatti*, Ass.

A moderate-sized evergreen tree. Bark thin, compact, brown, wrinkled, with an aromatic taste. Wood reddish grey, splits and warps, moderately hard, close-grained, slightly scented. Annual rings distinctly marked by a narrow belt of firmer wood on the outer edge with fewer pores. Pores small to moderate-sized. Medullary rays fine, numerous, equidistant.

Himalaya, sparingly from the Indus to the Sutlej, common thence eastwards between 3,000 and 7,800 feet, Eastern Bengal, Khasia Hills and Burma. Growth moderate, the Darjeeling specimen shewing 6 rings, that from Jaunsar 7, and the Hazara one 10 rings per inch of radius. Weight, 39 lbs. per cubic foot. The wood is not used. The bark is largely collected and sold under the name of *Taj*. The leaves are also much sold under the names *Tezpat*, *tajpat*.

		lbs.
H 937.	Hazara, 4,000 feet	40
H 3162.	Dungagalli, Hazara, 4,000 feet	...
H 427.	Bagiyar Forest, Jaunsar, 4,000 feet	35
E 575.	Sukna Forest, Darjeeling Terai	42

4. C. glanduliferum, Meissn.; Brandis 376; Gamble 64. Nepal Camphor Wood. Vern. *Malligiri*, *marisgiri*, Nep.; *Rohu*, Lepcha; *Gunserai*, Mechi, Ass.; *Gundroi*, Cachar.

A large tree. Bark 1 to 2 inches thick, dark grey, uneven, outside corky, highly scented. Wood rough, pale brown, highly scented with a strong smell of camphor when fresh cut, has a certain lustre. The wood distantly resembles that of an *Albizzia* on a vertical section, but is rougher; it is soft to moderately hard, even-grained. Annual rings marked by a distinct line. Pores between moderate-sized and large, uniformly distributed, often oval and subdivided and filled with a glittering resinous substance. Medullary rays short, numerous, uniformly distributed, fine or moderately broad, the distance between the rays generally less than the transverse diameter of the pores, distinctly marked on a vertical section.

South Himalaya from Kumaun eastwards, Assam, Khasia Hills and Burma. Growth fast, 2 to 3 rings per inch of radius. Weight, 38·5 lbs. per cubic foot. Wood durable, easily worked, is not touched by insects. It is used for canoes and boat-building; in Sikkim for boxes, almirahs and other articles, and for planking. It is being tried for sleepers.

E 670.	Dulka Jhar, Darjeeling Terai	
E 2413.	Tista Valley, Darjeeling	
E 628.	Eastern Dúars, Assam	
E 639.	Kámrúp, Assam	
E 2304.	Nowgong, ”	

5. C. sp (perhaps *C Parthenoxylon*, Meissn , Kurz ii 289, or *Aperula Neesiana*, Bl , see Brandis 383). Vern *Karaway*, Burm

Wood orange-brown, scented, moderately hard, oily to the touch Pores moderate-sized and large, often subdivided, filled with resin, the transverse diameter often equal to, or slightly larger than, the distance between the fine, prominent, medullary rays It resembles the wood of *C glanduliferum* in structure.

South Tenasserim
Weight, 43 to 46 lbs per cubic foot Wood durable, used for house building and shingles

			lbs
B 1915	Tavoy	.	43
B 2483	"	.	46

6. C. sp Vern *Hmanthin*, Burm

Wood white with a pink tinge, shining, moderately hard, highly scented Pores moderate sized, often subdivided, frequently filled with resin, their transverse diameter generally equal to the distance between the short, fine, prominent medullary rays In structure the wood most resembles that of *C obtusifolium*

South Tenasserim
Weight, 36 to 43 lbs per cubic foot The wood is plentiful at Tavoy and Mergui, where it is used for building

			lbs
B 1946	Tavoy	. . .	43
B 2482	"	. . .	36

7. C. sp Vern *Sinkozi*, Burm.

Wood red, soft, strongly scented Pores moderate-sized, often subdivided, their transverse diameter generally equal to, or less than, the distance between the short and fine medullary rays Somewhat resembles in structure the wood of *C parviflorum*.

South Tenassserim
Weight, 41 lbs Found by the late Mr Lee in Mergui, but rather scarce

			lbs
B 1387.	Tavoy	. . . .	41

Nos B 298, Burma (1867), 24 lbs , B 2691 (40 lbs), B 2695 (39 lbs), B 2719 (36 lbs), Tavoy (Wallich, 1828), are all evidently Lauraceæ and probably *Cinnamomum* They have a light, soft, aromatic wood Pores moderate-sized, generally subdivided Medullary rays fine, equidistant, numerous

2. ALSEODAPHNE, Nees

A semecarpifolia, Nees , Beddome t. 297 Vern *Wirarana* Cingh , is a large tree of the Western Ghats and Ceylon, where it is known as a valuable timber of a yellow colour, which resists the attacks of "teredo and is used for building and boats *A grandis*, Nees , Kurz ii 293, is an evergreen tree of Burma with a yellowish wood.

1. A. sp Vern *Dowki poma*, Assam

Wood soft, red, even-grained Pores small, in radial lines Medullary rays fine, red, equidistant, visible on a radial section

Assam
Weight, 32 lbs per cubic foot. Used for boats, furniture and building

			lbs.
E 633	Eastern Duars, Assam	.	32

3. PHŒBE, Nees.

Contains about 7 species. *P. pallida*, Nees; Brandis 377. Vern. *Kanwál*, Kumaun, is a small tree of the Himalaya from Kumaun eastwards and Burma. *P. paniculata*, Nees; Brandis 377 [*P. villosa*, Wight, and *P. pubescens*, Nees, Kurz ii. 290. *P. Wightii*, Meissn.; Beddome t. 292 (probably). *Laurus villosa* Roxb. Fl. Ind. ii. 310 (probably)] Vern. *Kumara*, Burghers; *Kapua kanwál* Kumaun; *Boltigachu*, Gáro; *Chekio*, Magh, is a tree of the Eastern Himalaya, Eastern Bengal, Burma and South India, with, according to Beddome, a good wood of a light red colour. *P. angustifolia*, Nees, is a tree of the Khasia Hills. *P. glaucescens*, Nees; Gamble 64. Vern. *Surúl*, Nep., is a tree of the Eastern Himalaya and Eastern Bengal.

1. P. lanceolata, Nees; Brandis 377; Kurz ii. 290; Gamble 64. *Laurus lanceolaria*, Roxb. Fl. Ind. ii. 309. Vern. *Chan, chandra, badror, shalanghi*, Pb.; *Haulia, dandorla, káwal, sún kawal, bilphari*, Hind.; *Dupatti*, Mechi; *Nuni ajhar*, Gáro; *Sun kanwál*, Kumaun.

A small evergreen tree. Wood white, hard, close-grained. Annual rings marked by a distinct line. Pores moderate-sized, often oval and subdivided, or in short radial lines, uniformly distributed. Medullary rays fine, equidistant. The wood turns brown on exposure, and varies in colour in different localities.

Outer Himalaya from the Jumna to Bhutan, ascending to 6,000 feet, Khasia Hills, Sylhet, Burma and the mountains of South India.

Growth fast, 3 to 4 rings per inch of radius. Weight, 46 to 55 lbs. per cubic foot.

			lbs.
H	91.	Bhajji, Simla, 4,000 feet	46
E	2415.	Chunbati, Darjeeling, 2,500 feet	55

2. P. attenuata, Nees; Gamble 64. Vern. *Dudri*, Nep.; *Lepcha-phal*, Darjeeling; *Phani*, Lepcha.

A large evergreen tree. Wood grey, turning darker on exposure, hard, even-grained. Annual rings marked by a distinct line. Pores large and moderate-sized, uniformly distributed, frequently oval and subdivided. Medullary rays fine, equidistant.

Sikkim and Bhutan, from 4,000 to 8,000 feet, hills of Eastern Bengal.

Growth moderate, 5 to 9 rings per inch of radius. Weight, 39 to 44 lbs. per cubic foot. Much used at Darjeeling for building, for tea-boxes and other purposes. The fruit is large, when ripe the size of a green walnut; it is eaten by Lepchas. (The identity of this species requires further investigation; it is a very handsome tree with long, narrow leaves.)

			lbs.
E	363.	Rangbúl, Darjeeling, 7,000 feet	44
E	2416.	Chuttockpur Forest, Darjeeling, 6,000 feet . . .	39

4. MACHILUS, Rumphius.

Contains about 9 species. *M. macrantha*, Nees; Beddome t. 264. Vern. *Kromá*, Burghers; *Iruli*, Kaders; *Kurma*, Kan.; *Ullalu*, Cingh., is a large tree of the Western Ghâts and Ceylon, with a soft, light, even-grained wood, used for building. *M. rimosa*, Bl., *M. fruticosa*, Kurz, and *M. tavoyana*, Meissn.; Kurz ii. 292, are trees of Tenasserim. *M. khasyana*, Meissn., is a tree of the Khasia Hills.

1. M. odoratissima, Nees; Brandis 378; Gamble 64. *M. indica*, Lour.; Kurz ii. 291. Vern. *Dalchini, mith-palta, prora, badror, leddil*, Pb.; *Kawala*, Hind.; *Kawala, lali, jagrikat*, Nep.; *Phamlet*, Lepcha; *Soom*, Ass.; *Dingpingwait*, Khasia.

A large tree. Wood grey, darkening and turning red on exposure, soft to moderately hard, even-grained. Pores moderate-sized, often oval and subdivided, their transverse diameter equal to the distance between the uniformly distributed fine medullary rays. Annual rings very indistinct.

[illegible] of radius, a tree exa[illegible] s per inch. Weight 401 [illegible] mon, for building, chi[illegible] e forests, which are use[illegible] ve the "Muga" or "Moonga" silk. This silk, which is chiefly produced on the *Soom* tree, is also pro- [illegible]

[illegible] by Dr Brandis

			lbs
H	92	The Glen, Simla, 6,000 feet	37
H	929	Hazara, Punjab	39
E	435.	Rangbul Forest, Darjeeling, 7,000 feet	43
E	2414	" " "	36
E	592	Khookloong Forest, Darjeeling Terai	43
E	1271.	Lakhimpúr, Assam	43

5. BEILSCHMIEDIA, Nees.

Contains about 4 species *B fagifolia*, Nees, Beddome t 263, Brandis 379, is a large tree of the Western Gháts with a good timber used for building *B macrophylla*, Meissn, is a tree of Mergui *B assamica*, Meissn, is a tree of Assam, and *B globularia*, Kurz, a tree of the hill forests of Martaban

1. B. Roxburghiana, Nees, Brandis 378, Kurz ii 293; Gamble 64. *Laurus bilocularis*, Roxb. Fl. Ind. ii 311 Vern. *Konhárah*, Oudh; *Tarsing*, Nep., *Kanyu*, Lepcha, *Tapchi*, Gáro, *Serai-guti*, Ass, *Shatoobeng*, Burm.

An evergreen tree. Wood white, moderately hard, even-grained; heartwood with red and green streaks Annual rings marked by sharp lines. Pores moderate-sized, scanty, oval and subdivided. Medullary rays fine and very fine, numerous

Eastern Himalaya up to 8,000 feet, Eastern Bengal, Burma and the Andaman Islands

Growth moderate, 5 to 9 rings per inch of radius Weight, 36 5 lbs per cubic foot. Wood used in Assam for boats, in Darjeeling for building, tea-boxes and other purposes

			lbs
E	1258.	Tezpur, Assam	36
E	1264	" "	39
E	700	Chuttockpur Forest, Darjeeling, 6,000 feet	35
E	2419	Rangbul " " 7,000 "	36

These two last have less numerous pores.

6. TETRANTHERA, Jacq.

[illegible] in the "Prodromus" as occurring in India and Bur- [illegible]

land. In Assam the leaves are used to feed the silkworms which produce the "muga" silk (*Antheræa Assama*). *T. grandis*, Wall.; Kurz ii. 299, is an evergreen tree of the forests of Burma, having, according to Kurz, a handsome yellow wood with a fine lustre. *T. Wightiana*, Wall.; Beddome t. 293. Vern. *Keyngee*, Burghers'; *Hammadi*, Kan. is a tree of the forests of the Western Gháts from 2,000 to 8,000 feet, having a handsome yellow wood, which is used for building. *T. glauca*, Wall.; Kurz ii. 300; Gamble 65. Vern. *Sempat*, Nep.; *Diglilati*, Mechi; *Diglotti*, Ass., is an evergreen tree of the outer Eastern Himalaya and Eastern Bengal on the leaves of which in Assam the Muga silkworms are sometimes fed.

1. **T. laurifolia**, Jacq.; Brandis 379; Kurz ii. 297; Gamble 65. *T. apetala*, Roxb. Fl. Ind. iii. 819. Vern. *Maida, meda, gwá, rián, chandra*, Pb.; *Garbijaur, singrauf, medh, ménda*, Hind.; *Suppatnyok*, Lepcha; *Kukúr chita*, Beng.; *Narra alagi*, Tel.; *Ungdung*, Burm.

A moderate-sized evergreen tree. Bark 1 inch thick. Wood greyish brown or olive grey, moderately hard, shining, close and even-grained, seasons well, durable, is not attacked by insects. Annual rings indistinctly marked by a white line. Pores small and moderate-sized, often subdivided, uniformly distributed. Medullary rays fine and moderately broad.

Kumaun, Garhwal, Bengal, Burma, Central and South India.

Growth moderate, 6-7 rings per inch of radius. Weight, 47 lbs. per cubic foot A fine wood worth notice. The bark is used medicinally for external application bruised and mixed with goat's milk, for sprains and bruises.

			lbs.
O	253.	Garhwal (1868)	48
O	1378.	Gonda, Oudh	45
O	1484.	Kheri „	48
D	1087.	Madura, Madras	46
B	2286.	Andaman Islands (1866)	47

2. **T. monopetala**, Roxb. Fl. Ind. iii. 821; Brandis 380; Kurz ii. 299; Gamble 65. Vern. *Meda, gwa, singraf, sangran, marda, kat marra, kakúri, kerauli, patoia, katmoria, papria, katmedh, kari, randkari*, Hind.; *Mendah, kari, kjera, toska, leja*, Gondi; *Leinja*, Kurku; *Ratmanti, kadmero*, Nep.; *Suphut*, Lepcha; *Bút, mogasong*, Mechi; *Sualu*, Ass.; *Huara*, Cachar; *Bolbek*, Gáro; *Ranamba*, Mar.; *Ungdung*, Burm.

A moderate-sized evergreen tree. Bark dark grey, smooth, when old exfoliating in corky scales. Wood olive grey, soft, not durable, is readily attacked by insects. Annual rings indistinct. Pores moderate-sized, uniformly distributed, often oval and subdivided. Medullary rays short, fine. The wood is very similar to that of *T. laurifolia*, but is softer, not durable, and the annual rings are not well marked.

Sub-Himalayan tract from the Ravi eastwards, Kumaun, Garhwal, Bengal, Burma, Central and South India.

Growth moderate to fast, 2 to 6 rings per inch of radius. Weight, 38 lbs. per cubic foot. The wood is used for agricultural implements. The leaves are used in Assam to feed the "muga" silkworms *Antheræa Assama*; they have a cinnamon-like smell when bruised.

			lbs.
O	246.	Garhwál (1868)	38
O	1367.	Gonda, Oudh	38

3. **T. tomentosa**, Roxb., Kurz ii. 297; Gamble 65. Vern. *Phusri*, Nep.; *Phane*, Lepcha.

A tree. Bark light brown, thin. Wood soft greyish-yellow with

an unpleasant odour when fresh cut. Pores small, uniformly distributed. Medullary rays fine, numerous. Annual rings marked by a faint line.

Himalaya, from Sirmur (Wallich) eastwards, common in the Sikhim Hills from 6,000 to 8,000 feet, South India and Burma

E 3374 Darjeeling, 6,000 ft

4. T. angustifolia, Wall. T. *saligna*, Nees. Vern. *Risapaing*, Beng.; *Shealbuk*, Magh.

A large shrub. Bark brown, thin. Wood soft, light brown or nearly white. Pores moderate-sized, uniformly distributed.

Medullary rays short, fine to moderately broad.

ion

marked

H

E 3283. Rinkheong Valley, Chittagong Hill Tracts.

E 717 (34 lbs) fro ... d sent under the name of "*Hooria*," is not *Tetranthera* Wood rays short, broad

7. LITSÆA, Juss.

Contains, according to Meissner, about 8 species, but most of these have been latterly joined under one species, *viz*, *L zeylanica*

Wood soft or moderately hard. Pores small, often in groups. Medullary rays fine, equidistant.

1. L. zeylanica, Nees; Beddome t. 294, Brandis 382. *L foliosa*, Nees. *L umbrosa*, Nees *L. scrobiculata*, Nees in DC Prodr. xv. Vern. *Chimdi*, *shalanglu*, *rauli*, *chilotu*, *charkhu*, *kaderu*, *narki*, *thirmal*, *zopru*, Pb; *Kanwal*, *titbora*, *sara*, *jhatela*, *chiiara*, *chirchira*, Hind.; *Belori*, Burghers; *Dawal kúrúndú*, Cingh.

A moderate-sized evergreen tree. Wood reddish white, with darker heartwood, moderately hard Annual rings distinctly marked by a stratum of firmer wood on the outside of each ring, where the pores are often arranged in oblique lines. Pores small, uniformly distributed. Medullary rays fine, numerous.

North-West Himalaya, between 2,000 and 8,000 feet, Eastern Bengal, Burma and South India

Growth slow, 13 rings per inch of radius Weight, 36 to 38 lbs per cubic foot The wood is used for house building in South India An oil is extracted from the fruit which is used for burning.

			lbs.
H	63	Nagkanda, Simla, 8,000 feet	36
H	3055	Mahasu, Simla, 7,000 feet	38

No 20 of Adrian Mendis' Ceylon Collection (51 lbs) marked *L zeylanica*, of Ceylon, has a shining wood with the same structure, but more close grained than that of the tree of the North-West Himalaya

2. L. consimilis, Nees, Gamble 65. *L. zeylanica*, Nees, Brandis 382 (part) Vern. *Chirira*, *chir chira*, Kumaun, *Pootch*, Nep.

A small evergreen tree with thin grey bark. Wood yellow, moderately hard, close-grained. Pores small, uniformly distributed. Medullary rays short, fine and moderately broad, the distance between the rays greater than the transverse diameter of the pores.

Himalaya from Simla eastwards.
Weight, 43 lbs. per cubic foot. A good wood. An oil is extracted from the fruit and used for burning.

	lbs.
E 2420. Hoom Linding, Darjeeling, 5,000 feet	43

3. L. lanuginosa, Nees; Brandis 382. Vern. *Kálban*, Pb.; *Kokra* Hind.

A moderate-sized tree. Bark brown. Wood yellow, when fresh cut. Pores small, arranged in radial groups and oblique lines. Medullary rays short, fine, numerous.

Outer Himalaya, from the Indus eastwards up to 6,000 feet.

H 2948. Sutlej Valley, 3,000 feet.

8. DAPHNIDIUM, Nees.

Contains about 6 species. *D. bifarium*, Nees; Brandis 383, is an evergreen shrub or tree of the Himalaya from Kumaun eastwards. *D. venosum*, Meissn., is from Bhutan. *D. argenteum*, Kurz ii. 307, is a deciduous tree of the low and Eng forests of Pegu and Martaban, said by Kurz to have a yellowish close-grained wood. These three, with *D. elongatum*, form the section with penniveined leaves. The section, with tri-nerved leaves contains, besides *D. pulcherrimum*, *D. melastomaceum*, Nees, of Assam, the Khasia Hills and Sylhet, and *D. caudatum*, Nees, Kurz ii. 307, an evergreen tree of the Khasia Hills, Eastern Bengal and the hills of Martaban and Tenasserim above 4,000 feet.

1. D. elongatum, Nees; Gamble 65. Vern. *Paieli, pooalay, phusri*, Nep.; *Phamlet*, Lepcha.

A large evergreen tree. Wood yellow, turning olive grey on exposure, moderately hard, even-grained. Pores small, occasionally in groups, uniformly distributed. Annual rings marked by firmer wood on the outside of each ring. Medullary rays fine, uniform and equidistant; the distance between them slightly greater than the transverse diameter of the pores.

Sikkim and Bhutan Himalaya, from 6,000 to 8,000 feet, Khasia Hills.
Growth moderate to slow, 10 to 22 rings per inch of radius. Weight, 34 to 41 lbs. per cubic foot. A very pretty wood, worthy of attention. Wood used for building, chiefly planking.

	lbs.
E 362. Rangbúl, Darjeeling, 7,000 feet	34
E 2418. " "	41

2. D. pulcherrimum, Nees; Brandis 383; Kurz ii. 306; Gamble 65. Vern. *Dadia*, Hind.; *Sisi*, Nep.; *Nupsor*, Lepcha; *Dingpingwai*, Khasia.

A large evergreen tree with thin bark. Wood reddish white, moderately hard, even-grained. Structure similar to that of *D. elongatum.*

Kumaun, Nepal and Sikkim Himalaya between 4.000 and 9.000 feet. Khasia Hills. Burma.

and in the Bengal Forest
to 40 lbs per cubic foot
The leaves are aromatic.

		lbs
E 368	Rangbul, Darjeeling, 7,000 feet	33
E 2417	" " " "	40

3. D. *nov sp* Vern. *Siltimber,* Nep.

A small evergreen tree. Wood grey, moderately hard Annual rings marked by firmer tissue on the outside of each ring. Pores small, uniformly distributed Medullary rays fine, uniform.

Higher Darjeeling Hills above 9,000 feet
Growth slow, 18 rings per inch of radius Weight, 42 lbs.

		lbs.
E 384.	Tonglo, Darjeeling, 10,000 feet	42

North America is the "Sassafras"

---

from Damaraw weigh

Persea Nan muh, Oliv, No. 3259, received from Japan by the G. Takeda, is the "Nan muh" tree of which the expensive coffins used wood is soft to moderate even-grained, of a dark res small to moderate sized, on a longitudinal section. ngs marked by a band of autumn wood

Weight, 34 to 35 lbs. per cubic foot.

Nos E 1290 Vern *Dumbail,* 31 lbs, and E 1292 Vern *Raun dolu,* 32 lbs, Cachar, have the structure of *Lauraceæ.* The pores are larger than in which they otherwise most resemble

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ORDER LXXXVI. MYRISTICACEÆ.

1. MYRISTICA, Linn.

Contains about 12 to 14 species of Indian trees Five species are found in and Eastern Bengal, four in Burma, six in Bombay and South India, and four

A small evergreen tree with thin grey bark. Wood yellow, moderately hard, close-grained. Pores small, uniformly distributed. Medullary rays short, fine and moderately broad, the distance between the rays greater than the transverse diameter of the pores.

Himalaya from Simla eastwards.
Weight, 43 lbs. per cubic foot. A good wood. An oil is extracted from the fruit, and used for burning.

		lbs.
E 2420.	Hoom Linding, Darjeeling, 5,000 feet	43

3. L. lanuginosa, Nees; Brandis 382. Vern. *Kálban,* Pb.; *Kokra,* Hind.

A moderate-sized tree. Bark brown. Wood yellow, when fresh cut. Pores small, arranged in radial groups and oblique lines. Medullary rays short, fine, numerous.

Outer Himalaya, from the Indus eastwards up to 6,000 feet.

H 2948. Sutlej Valley, 3,000 feet.

8. DAPHNIDIUM, Nees.

Contains about 6 species. *D. bifarium,* Nees; Brandis 383, is an evergreen shrub or tree of the Himalaya from Kumaun eastwards. *D. venosum,* Meissn., is from Bhutan. *D. argenteum,* Kurz ii. 307, is a deciduous tree of the low and Eng forests of Pegu and Martaban, said by Kurz to have a yellowish close-grained wood. These three, with *D. elongatum,* form the section with penniveined leaves. The section, with tri-nerved leaves contains, besides *D. pulcherrimum, D. melastomaceum,* Nees, of Assam, the Khasia Hills and Sylhet, and *D. caudatum,* Nees, Kurz ii. 307, an evergreen tree of the Khasia Hills, Eastern Bengal and the hills of Martaban and Tenasserim above 4,000 feet.

1. D. elongatum, Nees; Gamble 65. Vern. *Paieli, pooalay, phusri,* Nep.; *Phamlet,* Lepcha.

A large evergreen tree. Wood yellow, turning olive grey on exposure, moderately hard, even-grained. Pores small, occasionally in groups, uniformly distributed. Annual rings marked by firmer wood on the outside of each ring. Medullary rays fine, uniform and equidistant; the distance between them slightly greater than the transverse diameter of the pores.

Sikkim and Bhutan Himalaya, from 6,000 to 8,000 feet, Khasia Hills.
Growth moderate to slow, 10 to 22 rings per inch of radius. Weight, 34 to 41 lbs. per cubic foot. A very pretty wood, worthy of attention. Wood used for building, chiefly planking.

		lbs.
E 362.	Rangbúl, Darjeeling, 7,000 feet	34
E 2418.	" "	41

2. D. pulcherrimum, Nees; Brandis 383; Kurz ii. 306; Gamble 65. Vern. *Dadia,* Hind.; *Sisi,* Nep.; *Nupsor,* Lepcha; *Dingpingwai,* Khasia.

A large evergreen tree with thin bark. Wood reddish white, moderately hard, even-grained. Structure similar to that of *D. elongatum.*

Kumaun, Nepal and Sikkim Himalaya between 4,000 and 9,000 feet, Khasia Hills, Burma.

ınd in the Bengal Forest
o 40 lbs per cubic foot.
The leaves are aromatic.

		lbs
E 368	Rangbúl, Darjeeling, 7,000 feet	33
E 2417	" " " "	40

3. D. *nov sp* Vern *Sillimber*, Nep.

A small evergreen tree. Wood grey, moderately hard. Annual rings marked by firmer tissue on the outside of each ring. Pores small, uniformly distributed Medullary rays fine, uniform.

Higher Darjeeling Hills, above 9,000 feet
Growth slow, 18 rings per inch of radius Weight, 42 lbs

		lbs.
E 384.	Tonglo, Darjeeling, 10,000 feet	42

…hing, our speci-
…ibic foot, is the
very hard and
heavy, with the centre almost black. Pores moderate sized, often filled with yellow resin Medullary rays fine, uniform equidistant, the distance between the rays being equal to the transverse diameter of the pores. According to Laslett P = 1,000.

Persea Nan muh, Oliv, No. 3259, received from Japan by the kindness of Mr. G Takeda, is the "Nan muh" tree of which the expensive coffins used in China by
wood is soft to moderately hard, with
even-grained, of a dark olive brown
…res small to moderate sized, uniformly
on a longitudinal section. Medullary
…ngs marked by a band of darker coloured
autumn wood

Weight, 34 to 35 lbs per cubic foot.

Nos E 1290 Vern *Dumbail*, 31 lbs., and E 1292 Vern *Raun dolu*, 32 lbs, from Cachar, have the structure of *Lauraceæ*. The pores are larger than in *Beilschmiedia*, which they otherwise most resemble.

ORDER LXXXVI. MYRISTICACEÆ.

1. MYRISTICA, Linn.

Contains about 12 to 14 species of Indian trees Five species are found in Northern and Eastern Bengal, four in Burma, six in Bombay and South India, and four

in the Andamans. *M. moschata*, Willd.; Roxb. Fl. Ind. iii. 843. Vern. *Jaiphal* (nutmeg), *jati*, *jauntari* (mace), is the tree whose fruit gives the spices known as "nutmeg" and "mace," the former is the hard albumen and the latter the aril of the seed. The tree is cultivated in many parts of India, in Ceylon and in the Malay Archipelago. *M. elliptica*, Wall.; Kurz ii. 282, is an evergreen tree of the Andamans. *M. laurifolia*, Hook f. and Th., is a common large tree of the Western Ghâts and Ceylon. *M. Farquhariana*, Wall.; Beddome t. 270. Vern. *Pindi*, Kan., is a common tree of the evergreen forests of Kanara. *M glabra*, Bl., is a tree of Sylhet. *M. amygdalina*, Wall.; Kurz ii. 283. Vern. *Toungsaga*, Burm., is an evergreen tree of Burma and the Andaman Islands. *M. longifolia*, Wall.; Kurz ii. 283; Gamble 67. (*M. linifolia*, Roxb. Fl. Ind. iii. 847) Vern. *Gurmungban*, Magh; *Zadeip-hpo*, Burm, is an evergreen tree of Northern and Eastern Bengal and Burma. *M. erratica*, Hook. f. and Th., and *M. gibbosa*, Hook. f. and Th., are trees of the Khasia Hills. *M. attenuata*. Wall.; Beddome clxxvi., is a tall tree of the Concan Ghâts of Bombay. *M. corticosa* Hook. f. and Th.; Beddome t. 271; Kurz ii. 284; Gamble 68 (*M. angustifolia*, Roxb. Fl. Ind. iii. 847), is an evergreen tree of the forests of Northern and Eastern Bengal, Burma, South India and the Andaman Islands. *M. magnifica*, Beddome t. 268, Vern. *Ramanadike*, Kan., is a very large tree of Travancore.

1. M. malabarica, Lamk.; Beddome t. 269. Vern. *Kánagi*, Kan., *Pindi-kai* (seeds).

A small evergreen tree. Wood reddish grey, moderately hard. Annual rings (?) marked by concentric lines. Pores moderate-sized, oval, not numerous, uniformly distributed. Medullary rays fine, not prominent.

South Kanara and Malabar.

Weight, 32 lbs. per cubic foot. Wood used for building. The seeds give an oil which is used for burning and as an ointment for sores.

		lbs.
W 736.	South Kanara	39

2. M. Irya, Gaertn.; Beddome clxxvi.; Kurz ii. 282. Vern. *Maloh*, Burm.; *Mutwindá*, *chooglum*, And.

A moderate-sized evergreen tree. Wood dark olive grey, hard, close-grained. Annual rings marked by distinct lines. Pores moderate-sized and large, oval and subdivided, uniformly distributed. Medullary rays numerous, very fine, wavy, bent outwards where they touch the pores, prominent on a radial section; the distance between the rays smaller than the transverse diameter of the pores.

Burma, Andaman Islands and Ceylon.

Weight, 52 lbs. per cubic foot. A handsome wood and worthy of attention; it seasons well and takes a good polish.

		lbs.
B 509.	Andaman Islands	52

ORDER LXXXVII. THYMELACEÆ.

Contains 6 Indian genera belonging to 2 tribes, *viz.*,—

Tribe I.—Thymeleæ	*Daphne*, *Edgeworthia*, *Wikströmia*, *Lasiosiphon* and *Linostoma*.
„ II.—Aquilarineæ	*Aquilaria*.

Edgeworthia Gardneri, Meissn.; Brandis 386; Gamble 67. Vern. *Kaghuti*, *argili*, Nep., is a large shrub of Nepal, Sikkim and Bhutan, from 4,000 to 7,000 feet, with a white, thick, fibrous bark. Wood grey, light, soft with little lustre. It is the chief species used in the manufacture of the Nepal paper, and it gives the whitest

kind The paper is very tough, and large quantities are made in Nepal and Sikkim *Wikstromia virgata*, Meissn, Beddome clxxviii, Brandis 386 Vern *Bhatniggi*, *thilak*, Pb, *Chamlia*, Kumaun, is a small shrub of the Himalaya from the Indus eastwards the Khasia Hills and Ceylon, between 5,000 and 7,000 feet An inferior sort of paper and rope is made of its bark in Kumaun *Lasiosiphon eriocephalus*, Dcne, Beddome clxxix Vern *Naha*, Cingh is a large shrub of Bengal and South India A fibre is obtained from its bark, which is, besides, used for poisoning fish in Ceylon *Linostoma* contains 4 species *L pauciflorum*, Griff, Kurz ii 334, is an evergreen shrub of the Martaban Hills at 3,000 to 4,000 feet, *L decandrum*, Wall, Kurz ii 334, a shrub of Chittagong, *L scandens*, Kurz ii 334, a shrub of Tenasserim, and *L siamense*, Kurz ii 335 a shrub of the *Eng* forests of Prome *Gyrinops Walla*, Gaertn, Beddome t 303 Vern *Walla*, Cingh, is a handsome small tree found in Ceylon *Lagetta lintearia*, Lamk is the Lacebark tree of Jamaica, whose liber is made into cloth, paper, lace, ropes, whips and other articles

1. DAPHNE, Linn

Contains about 7 species *D cachemiriana*, Meissn, from the Pirpanjal, and *D oleoides*, Schreber, are described by Brandis, p 385, under *D mucronata* *D pendula* Sm, Kurz ii 333, is an evergreen shrub of the Martaban Hills at 5,000 to 6,000 feet elevation *D Wallichii*, Meissn Vern *Chhota aryili*, Nep, and *D longifolia*, Meissn Vern *Shedbarua*, Nep, are shrubs of the Eastern Himalaya, Khasia Hills and Eastern Bengal, whose bark is used in the manufacture of paper, the latter species yielding the commoner coarse kind *D Mezereum*, Linn, the "Mezereum" with deciduous leaves, and *D Laureola*, Linn, the "Spurge Laurel," with evergreen leaves, are well-known European shrubs

Pores very small, arranged in oblique tails or irregular patches (*D. Mezereum*) Medullary rays fine or very fine.

1. D. mucronata, Royle, Brandis 384. Vern. *Laghúne*, Afg.; *Pech*, Sind; *Kútilál, kanthan, gandalún, shalangri, zosho, shing, mashúr, swána, jikri, dona, channi niggi, kágsari, sind, kansian, sonái*, Pb.

A small evergreen shrub. Wood white, soft. Pores very small and extremely small, arranged in oblique tails. Medullary rays numerous, very fine. Numerous faint concentric lines across the rays.

…to 9,000 feet The bark and leaves … to cause nausea and

H 2826 Cheog Forest, Simla, 7,000 feet.
H 2828 Simla, 7,000 feet

2. D. papyracea, Wall.; Brandis 386; Gamble 67. Vern. *Niggi*, Pb, *Set baruwa, satpúra*, Hind.; *Balwa*, Kumaun, *Gande, kaghuti*, Nep., *Dayshing*, Bhutia.

A large shrub. Bark grey, smooth, liber well developed and yielding a very strong fibre which is used for the manufacture of ropes and paper Wood white, moderately hard. Pores extremely small in long narrow oblique and bending tails of soft tissue. Medullary rays fine, numerous.

Himalaya from near the Indus to Bhutan, between 3,000 and 9,000 feet, Khasia Hills

Growth moderate, 9 rings per inch of radius Weight, 34 lbs per cubic foot. Flowers very sweet scented Bark used to make Nepal and Bhutia paper, the commoner thin kind, also to make ropes for various purposes such as carrying loads

		lbs
E 2408	Darjeeling, 7,000 feet	34

2. AQUILARIA, Lam.

Two species only of this genus are known from India. *viz.*, *A. Agallocha*, here described, and *A. malaccensis*, Lamk.; Kurz ii. 336, from Tenasserim, which, according to Meissner, is the "Garo de Malacca" or Malacca Eaglewood. There is still some doubt about the identification of the species of *Aquilaria* which yields the Eaglewood of commerce. Roxburgh says the *A. Agallocha* is an immense tree, a native of the mountains east and south-east of Sylhet between 24° and 25° north latitude. "There can be little doubt that this is the tree which furnishes the real Calambac or Agallochum of the ancients, and there seems more reason to think that it was carried to China from our eastern frontier than to suppose it was carried from Cochin China or any other country in the vicinity of China, where it has always been in great demand. Small quantities are sometimes imported into Calcutta by sea from the eastward; but such is always deemed inferior to that of Sylhet." Kurz seems to consider the Sylhet and the Tenasserim tree as the same species, and as the structure of the wood of both is identical, there is a strong probability of his view being correct. Further investigation, however, is necessary to ascertain if the species described by Roxburgh as growing in Assam and Sylhet (*A. Agallocha*) is identical with the tree furnishing the *Akyau* wood of Burma. As far as our account is concerned, we shall only speak of one species.

1. A. Agallocha, Roxb. Fl. Ind. 422; Brandis 387; Kurz ii. 335. Lign Aloes or Eaglewood. Vern. *Ugúr*, Hind., Beng.; *Sasi*, Ass.; *Akyau*, Burm.; *Kayu garu*, Malay; *Nwahmi*, Siam; *Nyaw-chah*, Chinese; *Kihay*, *sinnah*, Cingh.

A large evergreen tree. Wood white, soft, even-grained, scented when fresh cut. In the interior of old trees are found irregular masses of harder and darker coloured wood, which constitute the famous Eaglewood of commerce, called *Kaya garu* by the Malays, and *Akyau* by the Burmese. Pores small and moderate-sized, in short radial lines. Medullary rays fine, numerous; the distance between two consecutive rays less than the transverse diameter of the pores. Numerous short transverse bands of pores and intercellular ducts filled with a brownish substance.

Eastern Bengal, Burma, Malay Peninsula and Archipelago.

Growth moderate, 8 rings per inch of radius. Weight, Kyd gives 20 lbs.; our specimen 25 lbs. per cubic foot. Kyd gives P = 203. A description of Eaglewood and its method of collection is given in extracts from Mr. Lee's reports given at p. 80 of the Burma Forest Report for 1875-76, and at p. 19 of the Burma Forest Report for 1876-77. From these it appears that the Akyau is the most important forest produce of the forests of South Tenasserim and the Mergui Archipelago. It is found in fragments of various shapes and sizes in the centre of the tree, and usually, if not always, where some former injury has been received. To collect it the trees are felled and allowed to rot for about three years in the forest, when they are again visited, the tree cut into fragments, and the odoriferous wood cut out. Mr. Lee says that most usually the Akyau is found in the sapwood.

		lbs.
E 951.	Golaghát, Assam	24
B 1948.	Tavoy	23
B 2485.	"	29

ORDER LXXXVIII. ELÆAGNEÆ.

Contains 2 genera only, *Elæagnus* and *Hippophaë*.

Pores small and moderate-sized. Annual rings distinctly marked by a belt of larger pores. *Hippophaë* has numerous uniform and fine medullary rays, while *Elæagnus* has short rays of different width, which in some species are broad.

1. HIPPOPHAË, Linn.

[illegible] found in the Upper Sutlej Valley and from thence eastwards to Bhutan

1. H. rhamnoides, Linn , Brandis 388. Vern. *Tsarap, tsarma, sirma, tsúk, tarru, niechak, tserkar, tsermang,* Ladak, Piti and Lahoul.

A large thorny shrub, sometimes a small tree. Bark grey, rough, with vertical furrows. Heartwood yellowish brown, mottled, moderately hard, close-grained. Annual rings distinctly marked by the inner or spring wood being porous and mainly composed of numerous moderate-sized pores, the outer or autumn wood being more compact, with fewer and smaller pores. Medullary rays numerous, very fine, equidistant. The wood of the shrub from Lahoul has the same structure as the European one.

Inner tract of the North-West Himalaya, chiefly in moist, gravelly stream beds, from 5 000 to 10,000 feet

Growth fast, 5 r [illegible] to Mathieu, Fl For [illegible] dry branches for h [illegible] Inner Himalaya. [illegible] leaves are covered with silvery scales

H	135	Lahoul, 10,000 feet	44
H	3063	Kunawar, 8,000 „	...

2. ELÆAGNUS, Linn.

[illegible] Wall , *P. angustifolia,* [illegible] P, is a [illegible] [illegible] Mediterranean region [illegible] 25 feet with [illegible] Bark thick, [illegible], dark brown [illegible] Sapwood narrow; heartwood dark brown, [illegible] Medullary rays [illegible] Wood used for fuel." It gives a transparent gum. The fruit is eaten, and in Yarkand a spirit is distilled from it. It weighs, according to Mathieu, Fl. For., p. 245, 35 lbs. to 41 lbs. per cubic foot. It is often planted. *E. arborea,* Roxb. Fl. Ind. i. 441, Brandis 390, Kurz ii. 331. Vern. *Mauhang, Guri, Mongo,* [illegible], is an evergreen tree of Nepal, the Eastern Himalaya, Garo Hills and Burma.

1. E. latifolia, Linn.; Beddome [illegible]; Brandis 389; Gamble 67. *E. conferta,* Roxb. Fl. Ind. i. 440; Kurz ii. 331. Vern. *Guheia, [illegible],* Kumaun; *Jarila,* Nep.; *Gueru,* Beng.; *Karlong,* Magh.

A straggling evergreen shrub or small tree. Wood [illegible]. Pores [illegible] and small, in irregular, concentric belts, which, however, do not appear to be annual rings, between the belts the pores are smaller and scanty. Medullary rays fine and broad.

Himalaya, from Kumaun to Bhutan, Khasia Hills, Eastern Bengal and South India.

[illegible] Fruit eaten; it is acid and somewhat astringent. Beddome says it makes good tarts.

E	[illegible]	[illegible], Darjeeling, [illegible] feet	[illegible]

2. AQUILARIA, Lam.

Two species only of this genus are known from India, *viz.*, *A. Agallocha*, here described, and *A. malaccensis*, Lamk.; Kurz ii. 336, from Tenasserim, which, according to Meissner, is the "Garo de Malacca" or Malacca Eaglewood. There is still some doubt about the identification of the species of *Aquilaria* which yields the Eaglewood of commerce. Roxburgh says the *A. Agallocha* is an immense tree, a native of the mountains east and south-east of Sylhet between 24° and 25° north latitude. "There can be little doubt that this is the tree which furnishes the real Calambac or Agallochum of the ancients, and there seems more reason to think that it was carried to China from our eastern frontier than to suppose it was carried from Cochin China or any other country in the vicinity of China, where it has always been in great demand. Small quantities are sometimes imported into Calcutta by sea from the eastward; but such is always deemed inferior to that of Sylhet." Kurz seems to consider the Sylhet and the Tenasserim tree as the same species, and as the structure of the wood of both is identical, there is a strong probability of his view being correct. Further investigation, however, is necessary to ascertain if the species described by Roxburgh as growing in Assam and Sylhet (*A. Agallocha*) is identical with the tree furnishing the *Akyau* wood of Burma. As far as our account is concerned, we shall only speak of one species.

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A large evergreen tree. Wood white, soft, even-grained, scented when fresh cut. In the interior of old trees are found irregular masses of harder and darker coloured wood, which constitute the famous Eaglewood of commerce, called *Kaya garu* by the Malays, and *Akyau* by the Burmese. Pores small and moderate-sized, in short radial lines. Medullary rays fine, numerous; the distance between two consecutive rays less than the transverse diameter of the pores. Numerous short transverse bands of pores and intercellular ducts filled with a brownish substance.

Eastern Bengal, Burma, Malay Peninsula and Archipelago.

Growth moderate, 8 rings per inch of radius. Weight, Kyd gives 20 lbs.; our specimen 25 lbs. per cubic foot. Kyd gives P = 203. A description of Eaglewood and its method of collection is given in extracts from Mr. Lee's reports given at p. 80 of the Burma Forest Report for 1875-76, and at p. 19 of the Burma Forest Report for 1876-77. From these it appears that the Akyau is the most important forest produce of the forests of South Tenasserim and the Mergui Archipelago. It is found in fragments of various shapes and sizes in the centre of the tree, and usually, if not always, where some former injury has been received. To collect it the trees are felled and allowed to rot for about three years in the forest, when they are again visited, the tree cut into fragments, and the odoriferous wood cut out. Mr. Lee says that most usually the Akyau is found in the sapwood.

		lbs.
E 951.	Golaghát, Assam	24
B 1948.	Tavoy	23
B 2485.	„	29

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Pores small and moderate-sized. Annual rings distinctly marked by a belt of larger pores. *Hippophaë* has numerous uniform and fine medullary rays, while *Elæagnus* has short rays of different width, which in some species are broad.

1 HIPPOPHAE, Linn

he scales or hairs on the under surface of the
le Vern *Ashuk* Nep *Dur chuk* Kumaun,
S under surface of the leaves having a dense
tc found in the Upper Sutlej Valley and from
thence eastwards to Bhutan

1. H. rhamnoides, Linn, Brandis 388 Vern *Tsarap, tsarma, sirma, tsuk, tarru, niechak, tserkar, tsermang*, Ladak, Piti and Lahoul

A large thorny shrub, sometimes a small tree Bark grey, rough, with vertical furrows Heartwood yellowish brown, mottled, moderately hard, close grained Annual rings distinctly marked by the inner or spring wood being porous and mainly composed of numerous moderate-sized pores, the outer or autumn wood being more compact, with fewer and smaller pores Medullary rays numerous, very fine, equidistant The wood of the shrub from Lahoul has the same structure as the European one

Inner tract of the North West Himalaya chiefly in moist gravelly stream beds, from 5 000 to 10 000 feet

Growth fast 5 rings per inch of radius Weight 44 lbs per cubic foot according to Mathieu Fl For p 245 38 lbs to 54 lbs It is used for fuel and charcoal and the dry branches for hedges It is very valuable in the dry almost treeless tracts of the Inner Himalaya The fruit is eaten but is very acid, it is made into a preserve The leaves are covered with silvery scales

			lbs
H	135	Lahoul 10 000 feet	44
H	3063	Kunawar, 8 000 „	

2 ELÆAGNUS, Linn

andsome crown Bark thick, rugged dark brown furrows Medullary rays numerous

... it gives a transparent gum The fruit is eaten and in Yarkand a spirit is distilled from it It weighs according to Mathieu Fl For p 245 36 lbs to 41 lbs per cubic foot It is often planted *E arborea* Roxb Fl Ind i 441, Brandis 390 Kurz ii 331 Vern *Sheashong* Garo *Mingu* Burm, is an evergreen tree of Nepal the Eastern Himalaya Garo Hills and Burma

1 E latifolia, Linn, Beddome clxxx, Brandis 390, Gamble 67 *E conferta* Roxb Fl Ind i 440, Kurz ii 331 Vern *Ghiwain, mijhaula*, Kumaun, *Jarila*, Nep, *Guara*, Beng, *Kamboong*, Magh

A straggling evergreen shrub or small tree Wood white, soft Pores moderate sized and small, in irregular, concentric belts, which, however, do not appear to be annual rings, between the belts the pores are smaller and scanty Medullary rays fine and broad

Himalaya from Kumaun to Bhutan Khasia Hills, Eastern Bengal and South India

Weight 45 lbs per cubic foot Fruit eaten, it is acid and somewhat astringent Beddome says it makes good tarts

			lbs
E	2407	Tukdah Darjeeling 5 000 feet	45

2. E. umbellata, Thunberg; Brandis 390. Vern. *Ghiwáin, ghain, kankoli, bammewa,* Pb.

A thorny, deciduous shrub, with silvery grey leaves. Bark grey. Wood white, hard, even-grained, warps in seasoning. Annual rings distinctly marked by a narrow continuous belt of moderate-sized pores; in the rest of the wood the pores are very small and uniformly distributed, but occasionally intermediate bands of larger pores are found. Medullary rays short, fine and broad.

Himalaya, from near the Indus to Bhutan, between 3,000 and 10,000 feet.

Growth moderate, 10 rings per inch of radius. Weight, 45 lbs. per cubic foot. The fruit is eaten.

		lbs.
H 71.	Mashobra, Simla, 7,000 feet	45

ORDER LXXXIX. PROTEACEÆ.

A large Order of plants, chiefly Australian and South African, containing only one Indian genus, *Helicia.* Many of the species are cultivated on account of the beauty of their flowers or foliage; such are the species of *Hakea, Banksia* and *Grevillea,* the best known of which is *Grevillea robusta,* the 'Silk Oak,' a large tree of New South Wales, which has become quite established in gardens in Bengal and South India. It grows well in Calcutta, where a fine avenue of it may be seen at the Botanic Gardens.

Pores in concentric bands. Medullary rays very broad and prominent.

1. HELICIA, Lour.

Contains about 7 Indian species. *H. Cochin-Chinensis,* Lour.; Kurz ii. 311; Gamble 66, is an evergreen tree of the hills of Sikkim, Assam, and Martaban in Burma. *H. excelsa,* Bl.; Kurz ii. 312 (*Rhopala excelsa*; Roxb. Fl. Ind. i. 362), is a large tree of Chittagong and Tenasserim. *H. nilagirica,* Beddome clxxviii., is a shrub of the western slopes of the Nilgiris at an elevation of 3,000 to 4,000 feet. *H. pyrrobotrya,* Kurz ii. 312, is a tree of the Martaban Hills. *H. salicifolia,* Presl.; Kurz ii. 312, is a tree of Tenasserim; and *H. attenuata,* Bl. (*Rhopala moluccana,* Roxb. Fl. Ind. i. 364), a tree of the Khasia Hills.

1. H. robusta, Wall.; Beddome t. 301; Kurz ii. 311; Gamble 66. Vern. *Joweea,* Sylhet; *Tegala mugu,* Kan.; *Doukya beng,* Burm.

A small evergreen tree. Bark grey, ¼ inch thick. Wood pinkish grey, moderately hard. Pores small, in numerous, narrow concentric bands of softer tissue, interrupted by the broad and very broad medullary rays, which are prominent on a radial section.

Hills of Bengal, Burma, and Southern India.

Weight, 44 lbs. per cubic foot. Has very pretty flowers.

		lbs.
E 2409.	Sumbong, Darjeeling, 2,000 feet	44

Grevillea robusta has a rough bark, 3-16ths inch thick. Wood hard, light reddish brown, sapwood greyish white. Pores moderate-sized, scanty, in concentric patches of white tissue. These concentric patches are interrupted by the medullary rays and bend outward where they meet the rays, so that the concentric bands have a wavy outline. Medullary rays broad and very broad, very prominent on a radial section, showing a beautiful silver grain. The heartwood seems durable, but the sapwood decays quickly. It would be a handsome furniture wood. (O 3263, Saharanpur.)

ORDER XC LORANTHACEÆ.

Contains 4 Indian genera of evergreen parasitic shrubs, living on the stems, branches or roots of other shrubs or trees These genera are *Viscum*, *Arceuthobium*, *Loranthus* and *Ginalloa*

Viscum contains about 6 species which may be divided into 2 sections those

In Lahoul it is used medicinally, and in

monicum, Roxb Fl Ind iii 763, Brandis 393, Kurz ii 324, is a shrub, parasitic on *Elæodendron* and other trees in the Sub-Himalayan tract, Bengal and Burma *V ovalifolium*, Wall., Kurz ii 325, is a shrub of Tenasserim, and *V orientale*, Willd, Brandis 393, Kurz ii 324 (*V verticillatum*, Roxb Fl Ind iii 764), a shrub of Bengal and South India

To the second section belong *V articulatum*, Brown, Brandis 393, Kurz ii 325 (also *V moniliforme*, W and A, Kurz ii 325) Vern *Pand*, Hind, a parasitic shrub of the Himalaya, Khasia Hills, South India and Burma, found chiefly on Oaks, Rhododendron and Apricot *V attenuatum*, DC, Brandis 394, Gamble 66 Vern

France *Ginalloa* contains two parasitic shrubs *G Helferi*, Kurz ii 326, of Tenasserim, and *G andamanica*, Kurz ii. 326, found on "*Artocarpus Chaplasha*" in the Andamans

1. LORANTHUS, Linn.

sitical shrubs, some of them with very Brandis 396, is found in the outer ding to 4000 feet, chiefly on *Albizzia*, ll, Brandis 396, Kurz ii 318 Vern. -Himalayan *L cordi*- is, the first and *Salix*.

L farinosus, Desr, *L ...iflorus*, Wall, and *L globosus*, Roxb, Gamble 66, are common on Sál in Northern Bengal Kurz describes 17 species from Burma. Numerous species also occur in South India, and on the Nilgiris they are reported to have done such damage to the plantations of Australian *Acacia* as to have necessitated those plantations being given up In his "Report on Neilgherry Loranthaceous Parasitical Plants,'

pears, Australian ac are *L. obtusatus*, *L amplexifolius*, *leanus*, W and A., *Melanoxylon* has *A dealbata* has beer have been attacked

Most species are called *Pand* in Hindi, *Ajeru* in Nepalese and *Khyee poung* in Burmese.

1. L. vestitus, Wall.; Brandis 396. Vern. *Pand,* Hind.

A parasitic shrub. Wood reddish white, compact, close-grained, moderately hard. Pores very small, arranged in rounded groups or patches, which are uniformly distributed. Medullary rays short, fine to broad; the distance between the rays several times larger than the transverse diameter of the pores.

North-West Himalaya from the Ravi to Sikkim up to 7,000 feet, Khasia Hills. Growth slow, about 14 rings per inch of radius. Weight, 51 lbs. per cubic foot. It grows often to a large size, and is extremely common in some parts of the Himalaya, especially on the Oaks, *Q. incana* and *Q. dilatata.* It is also found on *Odina, Schleichera, Randia, Machilus* and other trees.

		lbs.
H 3033.	Theog, Simla, 7,000 feet (on *Q. dilatata*)	...
H 2938.	Below Naldehra, Simla, 5,000 feet (on *Q. incana*) . .	51

2. L. longiflorus, Desr.; Brandis 397; Kurz ii. 321; Gamble 66. *L. bicolor,* Roxb. Fl. Ind. i. 548. Vern. *Pand, amút,* Pb.; *Bánda,* C. P.; *Patha,* Banda; *Bara manda,* Beng.; *Proosti,* Lepcha; *Ajeru,* Nep.; *Yelinga wadinika,* Tel.; *Kaurak,* Bhíl.

A parasitical shrub. Wood reddish, moderately hard. Pores very small, very numerous. Medullary rays short, fine to very broad.

Outer Himalaya from the Jhelam eastwards, ascending to 7,500 feet, Bengal, Central and South India, Burma, Andaman Islands and Ceylon.

The commonest species. It has large, handsome, scarlet flowers. It grows on most trees; in North India on *Melia, Bauhinia, Albizzia, Mallotus,* the Mango, Peach and Pear; in Oudh on *Bassia, Buchanania, Diospyros;* in Sikkim on Sál and *Albizzia;* in the North-West Himalaya on Oak.

H 3061. Koti, Simla, 6,000 feet (on *Q. dilatata*).

ORDER XCI. SANTALACEÆ.

Contains 4 genera of Indian trees or shrubs: *viz.—Pyrularia, Henslowia, Osyris* and *Santalum.*

Henslowia heterantha, Hook. f.; Kurz ii. 328; Gamble 67. Vern. *Ajeru,* Nep., is a large mistletoe-like shrub, sometimes parasitic, sometimes terrestrial, of the North-East Himalaya and the hills of Martaban. *Osyris arborea,* Wall.; Beddome clxxxi.; Brandis 399 (*O. Wightiana,* Wall.) Vern. *Bakardharra, bakarja,* Kumaun; *Popli,* Belgaum; *Jhuri,* Nep., is a shrub of the Himalaya from Simla to Bhutan ascending to 7,000 feet, Western Ghâts and Ceylon, said by Aikin in Wallich's List to have a red-brown, hard, compact and fine-grained wood.

1. PYRULARIA, Mich.

Contains 2 species. *P. Wallichiana,* Meissn.; Beddome t. 304. Vern. *Benduga,* Kan., is a small tree of Coorg, the Wynaad and Ceylon, with a light-coloured, curiously-grained wood.

1. P. edulis, A. DC.; Gamble 66. Vern. *Amphi,* Nep.; *Safkyi,* Lepcha.

A small or moderate-sized thorny tree. Bark thin, grey. Wood white, moderately hard, close-grained. Pores small and very small, in oblique bands of softer tissue. Medullary rays fine and broad, numerous, prominently reticulated on a radial section.

Nepal, Sikkim and the Khasia Hills from 4,000 to 8,000 feet.

Growth moderate, about 8 rings per inch of radius. Weight 42 to 50 lbs. per cubic foot. Wood used by Burmans for hair-combing implements. From eaves.

		lbs.
E 2476.	Tukdah, Darjeeling, 5,000 feet	47
E 698.	Rungbul, Darjeeling, 7,000 feet	50

2. SANTALUM, Linn.

1. S. album, Linn.; Roxb. Fl. Ind. i. 442; Beddome t. 256; Brandis 399; Kurz ii. 329. Sandalwood. Vern. *Chandan*, *chandal*, *sandal*, Hind.; *Gandha*, Kan.; *Sandaku*, Burm.

A small evergreen tree, rarely exceeding 4 feet in girth and 30 feet in height. Bark dark grey, nearly black, rough, with short vertical cracks, inner substance dark red. Sapwood white, scentless, heartwood yellowish brown, strongly scented, very hard, very close-grained and oily. Annual rings distinctly marked by more numerous and slightly larger pores in the spring wood. Pores small, circular, numerous. Medullary rays short, fine, numerous, uniform and equidistant.

Dry region of South India. It grows naturally in the drier parts of Mysore, Coimbatore and Salem districts, extending south to Madura and north to Kolhapur, generally at an elevation of from 2,000 to 3,000 feet, in poor soils and seeking the protection of hedgerows and scrub jungle.

Regarding the rate of growth, not much information is available. The specimens in our collection show a growth of 5 to 7 rings per inch of radius. A tree in the Saharanpur Botanic Gardens, said to be 38 years old, measured 3 feet 4 inches in girth, giving 5·6 rings per inch of radius.

In Colonel Beddome's report on the forests of Northern Coimbatore, July 1876, the following data are given:—

		Age.	Height.	Girth.
Talle Mally Plantation commenced 1863-64.	Trees in unfavourable locality	14	5 to 6 feet	3 to 4 inches,
	Trees in favourable locality.	14	30	15
Bylur Plantation commenced 1870.	Planted 1870 .	6	10 to 15 „	8 to
	„ 1872	4	7 to 8 „	5 to

The first of these gives 25, the rest 6, 4 and 3·5 rings per inch of radius tively.

In his report of the 3rd March 1877 on the Salem forests, Colonel Beddome that the largest of 3 sandal trees which were growing under shade in favourable tions in the Denkincottah plantation on the Mailgherry hills had a height of 16 a girth of 8 inches. As the trees were planted in 1874 and were consequently years old at the time of measurement, their growth has been very fast.

Again, in his report on plantations and fuel reserves of 28th May 1878, C Beddome gives the following average measurements of trees in different plantations

	Age.	Height.	Girth.	
1 North Coimbatore, Talle Mally Plantation, 3,000 feet altitude	14 years	30 feet	15 in.	Put only where there is shade
2 North Coimbatore, Bylur Plantation, 3,200 feet altitude	7 „	8 to 15 „	8 to 11 „	
	4 „	8 to 8 „	5 to 6 „	
3 Nilgiris, Segur Plantation, 3,000 feet altitude	6 „	12 to 15		

or 6, 4·5 and 4·5 rings per inch of radius respectively.

In this plantation Colonel Beddome expects a yield per acre, when the plantation is mature, in 25 years, of at least 150 maunds of heartwood. There are 23 acres with about 21,000 trees. The growth in the Coimbatore plantations varies from 2 to 6 rings per inch, averaging $4\frac{3}{4}$ rings, but the locality in each case was favourable.

1. L. vestitus, Wall.; Brandis 396. Vern. *Pand*, Hind.

A parasitic shrub. Wood reddish white, compact, close-grained, moderately hard. Pores very small, arranged in rounded groups or patches, which are uniformly distributed. Medullary rays short, fine to broad; the distance between the rays several times larger than the transverse diameter of the pores.

North-West Himalaya from the Ravi to Sikkim up to 7,000 feet, Khasia Hills. Growth slow, about 14 rings per inch of radius. Weight, 51 lbs. per cubic foot. It grows often to a large size, and is extremely common in some parts of the Himalaya, especially on the Oaks, *Q. incana* and *Q. dilatata*. It is also found on *Odina, Schleichera, Randia, Machilus* and other trees.

Nepal Sikkim and the Khasia Hills from 4 000 to 5 000 feet

Growth moderate about 8 rings per inch of radius Weight 47 to 50 lbs per cubic foot Wood used by Bhutias for butter making implements Fruit eaten

		lbs
E 2406	Tukdah Darjeeling 5 000 feet	47
E 698	Rangbul Darjeeling 7 000 feet	50

2 SANTALUM, Linn

1 S album, Linn , Roxb Fl Ind i 442, Beddome t 256, Brandis 398, Kurz ii 329 Sandalwood Vern *Chandan, chandal, sandal,* Hind , *Gandha,* Kan , *San ta ku* Burm

A small evergreen tree rarely exceeding 4 feet in girth and 30 feet in height Bark dark grey, nearly black, rough, with short vertical cracks, inner substance dark red Sapwood white, scentless, heartwood yellowish brown, strongly scented, very hard, very close grained and oily Annual rings distinctly marked by more numerous and slightly larger pores in the spring wood Pores small, circular, numerous Medullary rays short, fine, numerous, uniform and equidistant

Dry region of South India It grows naturally in the drier parts of Mysore [illegible] Madura and north to Kolhapur [illegible] in poor soils and seeking the [illegible]

giving 5 6 rings per inch of radius

In Colonel Beddome s report on the forests of Northern Coimbatore July 1876 the following data are given —

		Age	Height	Girth
Talle Mally Plantation commenced 1863 64	Trees in unfavourable locality	14	5 to 6 feet	3 to 4 inches
	Trees in favourable locality	14	30	15
Bylur Plantation commenced 1870	Planted 1870	6	10 to 15	8 to 11
	1872	4	7 to 8	5 to 9 ,

The first of these gives 25 the rest 6 4 and 3 5 rings per inch of radius respectively [illegible]

years old at the time of measurement their growth has been very fast

Again in his report on plantations and fuel reserves of 28th May 1878 Colonel Beddome gives the following average measurements of trees in different plantations—

	Age	Height	Girth	
1 North Coimbatore Talle Mally Plantation 3 000 feet altitude	14 years	30 feet	15 in.	But only where there is shade
2 North Coimbatore Bylur Plantation 3 200 feet altitude	7 ,	8 to 15	8 to 11	
	4	8 to 8	5 to 6	
3 Nilgiris Segur Plantation 3 000 feet altitude	6	12 to 15		

or 6 4 5 and 4 5 rings per inch of radius respectively

[illegible] ntation [illegible] s with [illegible] 2 to 6

In an article in the "Indian Forester" for April 1878, Vol. iii., No. 4, entitled "Notes on Sandal," 8 trees or groups of trees in Mysore are mentioned, of whose approximate age there is some evidence. In some cases the girth was taken at the base; in others the mean girth is given.

The following are the measurements given in that paper:—

No. of trees.	Place.	Age (probable).	Girth.	No. of rings of radius.	Height of bole.	Total height.	
		Years.	Inches.		Feet.	Feet.	
1	Mudagerri . . .	55	20	17	9	...	Mean girth.
1	" . . .	41	27	10	12	50	Girth at base.
1	" . . .	43	35	8	...	17	Ditto.
1	" . . .	64	48	9	...	30	Ditto.
1	Ijapúr . . .	45	40	7	...	30	Mean girth.
1	" . . .	30	40	5	5	...	Ditto.
1	Bobagalli . . .	96	27	11	20	...	Girth at base.
7	" . . .	75	33	7	...	27½	Girth at 6 feet.

These measurements give an average of 9·2 rings per inch of radius. It will be seen that no approximately correct generalisation as to the usual rate of growth can be obtained. In good conditions it seems probable that 5 to 6 rings per inch is about the average rate, while in unfavourable places the average growth cannot be taken at much less than 10 rings per inch.

The weight of sandalwood is given by Fowke at 55 lbs.; by Skinner, No. 113, at 58 lbs.; our specimens average 61·5 lbs. per cubic foot. Fowke gives P = 878; Skinner 874. The heartwood is used for carving, for incense and perfume. It is an important article of trade in India, and is largely exported to China and Arabia. It has been found to be well suited for engraving. Sandalwood oil is distilled from the wood.

It is chiefly spread through the agency of birds, and comes up in hedges and under the shade of shrubs. It is very impatient of mutilation, is difficult to transplant, and suffers greatly from wounds in the bark. Plantations of sandal have been established in Mysore and Madras.

		lbs.
E 2489.	Botanic Gardens, Calcutta (from a tree which was blown down in the Cyclone of 1864)	56
D 1209.	Mysore	71
D 2307.	"	60
D 3140.	"	60
D 1360.	Salem, Madras	61
No. 41.	Salem Collection	61

B 1950, 62 lbs., was sent from Tavoy under the name of *Kalamet*. The specimen is evidently very old, of a brown colour, like that of the heartwood of sandal, and in structure it differs only in having more prominent medullary rays, which are broader than in sandal, uniform and equidistant. The wood is scented, resembling that of sandalwood, and it may possibly be another species of *Santalum*.

ORDER XCII. URTICACEÆ.

A large Order remarkable for many useful products, chiefly fibres, given by species belonging to it. The chief fibrous plants are the nettles, the 'Rhea,' the 'Puya,' the Paper Mulberry, *Antiaris* and *Sponia*. Fruits are given by the mulberries, figs and

species of *Artocarpus* India-rubber is produced by several species of *Ficus*, especially *F elastica*, while valuable timber is obtained from the Elms, Mulberries, *Artocarpus*, and other genera The Order is divided into 4 Sub Orders, and these into 12 tribes containing 25 genera—

SUB ORDER 1 URTICACEÆ—		
Tribe	I —Urereæ	*Laportea* and *Girardinia*
„	II —Bohmerieæ	*Bohmeria*, *Pouzolzia*, *Sarcochlamys*, *Villebrunea*, *Debregeasia* and *Maoutia*
SUB ORDER 2 MORACEÆ—		
Tribe	III —Strebleæ	*Phyllochlamys*, *Streblus* and *Pseudostreblus*
„	IV —Broussonetieæ	*Malaisia*, *Broussonetia* and *Plecospermum*
„	V —Moreæ	*Morus*
„	VI —Dorstenieæ	*Dorstenia*
SUB ORDER 3 ARTOCARPEÆ—		
Tribe	VII —Conocephaleæ	*Conocephalus*
„	VIII —Artocarpeæ	*Artocarpus* and *Cudrania*
„	IX —Ocmedieæ	*Antiaris*
„	X —Ficeæ	*Ficus*
SUB ORDER 4 ULMEÆ—		
Tribe	XI —Ulmeæ	*Ulmus*
„	XII —Celtideæ	*Celtis*, *Sponia* and *Gironniera*.

extremely common large, annual forest weed, with long stinging bristles It affords a fine silky fibre, which is used in Sikkim for ropes, twine, and coarse cloth like gunny. It is common throughout most of the hilly districts of India and Burma, but especially in the Himalaya

Urtica
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opes
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Fl.
from
up to
net

bags, twine and cloth

762
Sah
Ma
Hills

Malaisia tortuosa, Blanco, Kurz ii 466, is a large deciduous scandent shrub

is 410, Kurz ii 467, is the "Paper

The inner bark gives the *Tapa*

ide into paper, and in Siam and

l "palabeiks," which are used like

slates in Europe for writing on.

Dorstenia Griffithiana, Kurz ii. 462, is an evergreen low shrub of Tenasserim.

Conocephalus suaveolens, Bl.; Kurz ii. 430; Gamble 77, is a large climber of Northern and Eastern Bengal and Burma.

Cudrania javanensis, Trecul; Brandis 425; Gamble 73 (*Cudranus Rumphii*, Thw.; Beddome ccxx., *C. amboinensis*, Rumph.; Kurz ii. 434) Vern. *Manda, mandei, kangu*, Hind., is a straggling shrub of the Sub-Himalayan tract, Eastern Bengal and Ceylon. The bark is yellowish brown, smooth, and the wood used for fuel. *C. fruticosa*, Wight, and *C. frutescens*, Trecul; Kurz ii. 434, 435, are scandent Burmese shrubs.

Gironniera contains 4 to 5 trees. *G. reticulata*, Thw.; Beddome t. 313 (*G. cuspidata*, Planch.; Kurz ii. 470), is a large tree of the Western Ghâts and Burma, said to have a valuable timber. *G. nervosa*, Planch.; Kurz ii. 469, is a large tree of Chittagong and Burma. *G. lucida*, Kurz ii. 470, is a tree of the Andaman Islands; and *G. Thomsoni*, King; Gamble 73, a large tree of the Sikkim hills.

As regards structure, the following three types may be distinguished:—

1st.—Artocarpus type. Distinct dark-coloured heartwood (excepting *Antiaris, Sponia, Debregeasia* and *Pouzolzia*). Pores isolated, sometimes in groups, but not in concentric or oblique lines; sometimes enclosed in a ring. The species of a temperate climate have annual rings, which are generally marked by a belt of larger pores. To this belong the arborescent Urticeæ, *Böhmeria, Pouzolzia*, and *Debregeasia*; of Moreæ, *Morus* and *Broussonetia*; of Artocarpeæ, *Antiaris* and *Artocarpus*; and of Ulmeæ, *Sponia*.

2nd.—Ulmus type. Pores united by concentric narrow bands of softer texture; in the temperate species the annual rings are marked by a porous belt of large pores. To this belong: of Ulmaceæ, *Celtis* and *Ulmus*.

3rd.—Ficus type. Wood soft, no heartwood, consisting of alternate bands of soft and firm texture, the small or moderate-sized pores being generally included in the former. To this belong: of Moreæ, *Streblus*; and of Artocarpeæ, *Ficus*.

The only character which the species of the Order *Urticaceæ* may be said to have in common is that the medullary rays are prominent, fine, rarely moderately broad.

1. BÖHMERIA, Jacq.

Contains about 10 to 12 species. *B. macrophylla*, Don; Brandis 403; Kurz ii. 424; Gamble 76. Vern. *Saochála, golka*, Kumaun; *Kamli*, Nep., is a handsome long-leaved shrub of the outer Himalaya from Kumaun eastwards up to 4,000 feet, and the Khasia Hills. It gives a good fibre, used to make ropes and fishing lines. *B. travancorica*, Beddome ccxxv., is a small tree of the Wynaad, South Kanara Ghâts and Travancore hills up to 4,500 feet. *B. malabarica*, Wedd.; Kurz ii. 422; Gamble 76. Vern. *Takbret*, Lepcha; and *B. Hamiltoniana*, Wedd.; Kurz ii. 424; Gamble 76. Vern. *Taksur*, Lepcha; *Kanaitseik*, Magh; *Sapsha*, Burm., are common undershrubs which give a strong fibre. The first is found in the moister zones of India and Burma, the second in Northern and Eastern Bengal and Burma. *B. nivea*, Hook. and Arn.; Brandis 402 (*Urtica tenacissima*, Roxb. Fl. Ind. iii. 590), is the "China Grass" or "Rhea" plant, cultivated in Assam, Bengal and parts of North-West India for its fibre, which is one of the finest produced in the world. It is a finer fibre than jute, and the plant would be still more largely grown and exported were it not for its requiring a richer soil, and being more difficult of preparation.

1. B. rugulosa, Wedd.; Brandis 403; Gamble 76. Vern. *Geti, gainti*, Hind.; *Dar*, Nep.; *Sedeng*, Lepcha.

A small tree Wood red, moderately hard, even grained, seasons well Pores scanty, moderate-sized, often subdivided Medullary rays fine to broad, short, the distance between the rays as large as or larger than the transverse diameter of the pores The medullary rays shew on a radial section, giving the wood a mottled appearance

Garhwal Kumaun Nepal Sikkim and Bhutan

Growth fast 2 to 5 rings per inch of radius Weight 41 lbs per cubic foot It is a nice wood easy to cut and work and is used in Kumaun and Nepal for making bowls, in Sikkim for milk pails churns and other dairy utensils The Lepchas make cups bowls and tobacco boxes of it

			lbs
O	324	Garhwal (1868)	35
O	300J	„ (1874)	44
E	600	Khookloong Forest Darjeeling Terai	46
E	2443	Mangwa, Tista Valley, Darjeeling 3 000 feet	39

2 **B platyphylla,** Don, Brandis 403, Gamble 76 Vern *Gargela,* Hind, *Kamli,* Nep This is var *rotundifolia,* Wedd

A large shrub or small tree Bark thin greyish brown, longitudinally striated Wood moderately hard, reddish brown with occasional concentric bands of darker and lighter colour Pores moderate-sized, scanty Medullary rays moderately broad, the distance between them greater than the transverse diameter of the pores

Outer Himalaya up to 7 000 feet Khasia Hills E Bengal S India and Ceylon

E 3377 Darjeeling 6 500 feet

2 POUZOLZIA, Gaudichaud

Includes several Indian herbs or undershrubs

1 **P viminea,** Wedd, Brandis 405, Kurz ii 425, Gamble 77 Vern *Chhota kuail,* Nep, *Kyingbi,* Lepcha

A shrub or small tree with thin, grey bark Wood light reddish brown, hard, apt to warp Pores small and moderate sized, often subdivided, uniformly distributed Medullary rays moderately broad, numerous, uniform and equidistant

Kumaun, Nepal Sikkim Eastern Bengal Assam and Chittagong, ascending to 5 000 feet

Weight 37 lbs per cubic foot Growth very fast The leaves are eaten by Lepchas The bark is used to make ropes

		lbs
E 2447	Latpanchor, Darjeeling 4 500 feet	37

3 VILLEBRUNEA, Gaudichaud

Three species *V appendiculata* Wedd Gamble 77 (*Oreocnide acuminata,* Kurz ii 427 *Urtica acuminata* Roxb Fl Ind iii 592) Vern *Lipic lipiah* Nep, *Kaphitki* Lepcha *Bun rhea* Ass is a small tree of the North East Himalaya,

1. **V. frutescens,** Bl, Brandis 406, Gamble 77 *Urtica frutescens,* Thumb, Roxb Fl Ind iii 589 Vern *Gar tashiara, poidhaula, kagshi,* Kumaun, *Kirma,* Nep, *Takbret,* Lepcha

A shrub or small tree with a rough, dark grey bark. Wood brown moderately hard. Pores small. Medullary rays fine and broad, equidistant, the distance between the rays equal to the transverse diameter of the pores.

Himalaya, from Simla eastwards, Sikkim, Bhutan and Assam, ascending to 5,000 feet.

The fibre is used for ropes.

H 3130. Simla, 5,000 feet.

4. DEBREGEASIA, Gaudichaud.

1. D. bicolor, Wedd.; Brandis 405. *Urtica bicolor,* Roxb. Fl. Ind., iii. 589. Vern. *Kharwala, shakai,* Afg.; *Chainchar, chainjli, amrer, sandári,* Jhelum; *Sansaru, súss,* Chenab; *Siaru, talsiari,* Ravi; *Pincho, prin,* Sutlej; *Tashiári,* Kumaun.

A large shrub. Bark thin, grey. Wood soft, grey. Pores small and moderate-sized, uniformly distributed. Medullary rays moderately broad, uniform and equidistant.

Salt Range, North-West Himalaya, ascending to 5,000 feet.

Growth fast, 3 to 4 rings per inch of radius. Weight, 27 lbs. per cubic foot. The fibre is made into twine and ropes.

		lbs.
H 88.	Bhajji, Simla, 4,000 feet	27

2. D. longifolia, Wedd.; Brandis 405; Gamble 77. *Morocarpus longifolius,* Bl.; Beddome ccxxvi.; Kurz ii. 428. Vern. *Tashiari,* Nep.; *Kamhyem,* Lepcha; *Capsee,* Kan.; *Pwot-chau-beng,* Burm.

A small tree. Bark thin, greyish-brown, rough. Heartwood reddish brown, hard; sapwood white. Pores moderate-sized, scanty; annual rings marked by a line of closer pores. Medullary rays moderately broad, uniform, the distance between them equal to, or greater than, the transverse diameter of the pores.

North-East Himalaya up to 7,000 feet, Khasia Hills, South India and Burma. Common on old cultivations.

Growth fast, 4 rings per inch of radius. The fibre of the bark is occasionally used for ropes and to make fishing nets.

E 3328. Darjeeling, 6,500 feet.

3. D. leucophylla, Wedd. *Morocarpus Wallichianus,* Miq.; Kurz ii. 428. Vern. *Púrúni,* Nep.; *Senén,* Lepcha.

A small tree, erect or epiphytic. Bark brown fibrous, peeling off in small vertical papery flakes. Annual rings distinctly marked by a white line. Pores large, scanty, medullary rays fine to moderately broad, often bent where they touch the pores.

North-East Himalaya up to 7,000 feet, Khasia Hills and down to the upper forests of the Pegu Yoma.

Growth moderate, 5 rings per inch of radius. A very pretty plant with round leaves of the purest white beneath. Fibre used sometimes for cordage.

E 3329. Darjeeling, 6,000 feet.

5. STREBLUS, Loureiro.

1. S. asper, Lour.; Beddome ccxxi.; Brandis 410; Kurz 464; Gamble 73. *Trophis aspera,* Retz; Roxb. Fl. Ind. iii. 761. Vern.

Jindi, Pb, *Siora, karchanna, rusa*, Hind, *Sheora*, Beng, *Sahada*, Uriya, *Baranki, barinka, pakki*, Tel, *Karera, kharaoli*, Mar, *Karasni*, Gondi, *Mitli*, Kan, *Ungnai*, Magh, *Opnai*, Burm, *Gattao nitul*, Cingh

A small evergreen tree Bark ⅛ inch thick, soft, light grey, irregularly ribbed Wood white, moderately hard, no heartwood, no annual rings Pores small, in irregular concentric belts of soft tissue which contain the greater number of the pores and alternate with broader belts of firm tissue, in which a few pores are scattered Medullary rays fine, numerous, equidistant

Sub Himalayan tract from the Beas eastwards Bengal Central and South India, Burma and the Andaman Islands

		lbs
O 1478	Gonda Oudh	40
C 1165	Ahiri Reserve Central Provinces	39

6 PLECOSPERMUM, Trecul

1 P spinosum, Trecul, Beddome ccxx, Brandis 401 *Batis spinosa*, Roxb Fl Ind iii 762 Vern *Mainakat lara, maidal-lari*, Nep, *Gumbengfong* Mechi (?), *Koriti*, Tel

A large thorny shrub Bark thin, orange coloured, peeling off in thin brittle flakes Wood greyish white with a small bright orange-yellow heartwood, which is very hard Pores from small to large, joined by wavy, more or less concentric bands or lines of soft and often interrupted tissue, which alternate with shining bands of firmer texture of about the same width In the heartwood the pores are filled with a yellow resinous substance Medullary rays fine and very fine, wavy

Salt Range (rare on mountains at 3 000 feet) Rohilkhand Nepal Sikkim South India and Ceylon

Growth slow 12 rings per inch of radius Weight 50 lbs per cubic foot The wood is used in the Darjeeling Terai to give a yellow dye

		lbs
O 3134	*Dehra Dun*	*56*
E 487	Khookloong Forest Darjeeling Terai	45
E 2308	Darjeeling Terai	52
E 2448	Tukdah Forest Darjeeling 5 000 feet	47

7 MORUS, Linn

Contains 6 species which are all referred to one *M alba* by Bureau in DC Prodr, Vol xvii

M alba Linn Roxb Fl Ind iii 594 Brandis 407 Vern *Tut tul tulklu*,

is large y g o ...
Brandis 409 Kurz ii 467 Vern *Tut* Hind *Malaing* Burm is a tree wild and cultivated in the Himalaya from the Indus to Assam up to 4 000 feet, in Bengal and

A shrub or small tree with a rough, dark grey bark. Wood brown moderately hard. Pores small. Medullary rays fine and broad, equidistant, the distance between the rays equal to the transverse diameter of the pores.

Himalaya, from Simla eastwards, Sikkim, Bhutan and Assam, ascending to 5,000 feet.

The fibre is used for ropes.

H 3130. Simla, 5,000 feet.

4. DEBREGEASIA, Gaudichaud.

1. **D. bicolor,** Wedd.; Brandis 405. *Urtica bicolor,* Roxb. Fl. Ind., iii. 589. Vern. *Kharwala, shakai,* Afg.; *Chainchar, chainjli, amrer, sandári,* Jhelum; *Sansaru, súss,* Chenab; *Siaru, talsiari,* Ravi; *Pincho, prin,* Sutlej; *Tashiári,* Kumaun.

A large shrub. Bark thin, grey. Wood soft, grey. Pores small and moderate-sized, uniformly distributed. Medullary rays moderately broad, uniform and equidistant.

Salt Range, North-West Himalaya, ascending to 5,000 feet.

Growth fast, 3 to 4 rings per inch of radius. Weight, 27 lbs. per cubic foot. The fibre is made into twine and ropes.

	lbs.
H 88. Bhajji, Simla, 4,000 feet	27

2. **D. longifolia,** Wedd.; Brandis 405; Gamble 77. *Morocarpus longifolius,* Bl.; Beddome ccxxvi.; Kurz ii. 428. Vern. *Tashiari,* Nep.; *Kamhyem,* Lepcha; *Capsee,* Kan.; *Pwot-chau-beng,* Burm.

A small tree. Bark thin, greyish-brown, rough. Heartwood reddish brown, hard; sapwood white. Pores moderate-sized, scanty; annual rings marked by a line of closer pores. Medullary rays moderately broad, uniform, the distance between them equal to, or greater than, the transverse diameter of the pores.

North-East Himalaya up to 7,000 feet, Khasia Hills, South India and Burma. Common on old cultivations.

Growth fast, 4 rings per inch of radius. The fibre of the bark is occasionally used for ropes and to make fishing nets.

E 3328. Darjeeling, 6,500 feet.

3. **D. leucophylla,** Wedd. *Morocarpus Wallichianus,* Miq.; Kurz ii. 428. Vern. *Púrúni,* Nep.; *Senén,* Lepcha.

A small tree, erect or epiphytic. Bark brown fibrous, peeling off in small vertical papery flakes. Annual rings distinctly marked by a white line. Pores large, scanty, medullary rays fine to moderately broad, often bent where they touch the pores.

North-East Himalaya up to 7,000 feet, Khasia Hills and down to the upper forests of the Pegu Yoma.

Growth moderate, 5 rings per inch of radius. A very pretty plant with round leaves of the purest white beneath. Fibre used sometimes for cordage.

E 3329. Darjeeling, 6,000 feet.

5. STREBLUS, Loureiro.

1. **S. asper,** Lour.; Beddome ccxxi.; Brandis 410; Kurz 464; Gamble 73. *Trophis aspera,* Retz; Roxb. Fl. Ind. iii. 761. Vern.

Jindi, Pb , *Siora, karchanna, rusa*, Hind , *Sheora*, Beng , *Sahada*, Uriya , *Baranki, barinka, pakki*, Tel , *Karera, kharaoli*, Mar , *Karasni*, Gondi , *Mitli*, Kan , *Ungnai*, Magh , *Opnai*, Burm , *Gattao nitul*, Cingh

A small evergreen tree Bark ⅛ inch thick, soft, light grey, irregularly ribbed Wood white, moderately hard, no heartwood, no annual rings Pores small, in irregular concentric belts of soft tissue which contain the greater number of the pores and alternate with broader belts of firm tissue, in which a few pores are scattered Medullary rays fine, numerous, equidistant

Sub Himalayan tract from the Beas eastwards Bengal Central and South India, Burma and the Andaman Islands

45 lbs Kyd 42 to 75 lbs ; our ner P = 604 The wood is tough

and the rough leaves to polish wood and ivory

		lbs
O 1478	Gonda Oudh	40
C 1165	Ahiri Reserve Central Provinces	39

6 PLECOSPERMUM, Trecul

1 P. spinosum, Trecul , Beddome ccxx Brandis 401 *Batis spinosa*, Roxb Fl Ind iii 762 Vern *Mainakat-lara, maidal lari*, Nep , *Gumbengfong* Mechi (?) , *Koriti*, Tel

A large thorny shrub Bark thin, orange coloured, peeling off in thin brittle flakes Wood greyish white with a small bright orange yellow heartwood, which is very hard Pores from small to large, joined by wavy, more or less concentric bands or lines of soft and often interrupted tissue, which alternate with shining bands of firmer texture of about the same width In the heartwood the pores are filled with a yellow resinous substance Medullary rays fine and very fine, wavy

Salt Range (rare on mountains at 3 000 feet) Rohilkhand Nepal Sikkim, South India and Ceylon

Growth slow 12 rings per inch of radius Weight 50 lbs per cubic foot The wood is used in the Darjeeling Terai to give a yellow dye

		lbs
O 3134	Dehra Dun	56
E 487	Khookloong Forest Darjeeling Terai	45
E 2303	Darjeeling Terai	52
E 2448	Tukdah Forest Darjeeling 5 000 feet	47

7 MORUS, Linn

Contains 6 species which are all referred to one *M alba* by Bureau in DC Prodr, Vol xvii

M alba Linn Roxb Fl Ind iii 594 Brandis 407 Vern *Tut tul tulklu*,

Burma. Its fruit is long, cylindrical, sweet, but insipid. *M. atropurpurea*, Roxb. Fl. Ind. iii. 595, is a kind which was introduced from China and is now cultivated in many parts of India.

Wood hard, even-grained, seasons well, with yellow or brown heartwood. Annual rings distinctly marked generally by a belt of larger pores. Medullary rays fine, uniform.

1. M. indica, Linn.; Roxb. Fl. Ind. iii. 596; Brandis 408; Kurz ii. 468; Gamble 77. Vern. *Túl*, Pb.; *Tutri*, Hind.; *Shahtút*, Kumaun; *Túl*, Beng.; *Chhota kimbu*, Nep.; *Mekrap*, Lepcha; *Nuni*, Ass.; *Posa*, Burm.

A moderate-sized deciduous tree. Wood yellow with darker streaks of various colours, hard. Annual rings distinctly marked by a belt of closely packed, moderate-sized and large pores which are generally subdivided. The pores in the outer portion of the annual ring are very small, in small, irregular patches, uniformly distributed. Medullary rays moderately broad, short. The structure of this wood is very similar to that of *Morus alba* of Europe and Japan, but the medullary rays are broader and further apart.

Sub-Himalayan tract ascending to 5,000 feet, Sikkim valleys up to 4,000 feet. Cultivated throughout North India.

Growth, the specimen received from Multán had very little more than one ring per inch of radius; that from Madhopur shewed 5 rings; its growth must therefore be considered very fast.

Weight, our specimens gave, the Multán one, 42; the Madhopur one 47 lbs. per cubic foot. It is largely cultivated for its leaves, which are used to feed silkworms. In Assam, the silk of the 'Pat' worm (*Bombyx Textor* and *B. Crœsi*) is produced on this mulberry.

		lbs.
P 891.	Multán	42
P 1195.	Madhopur	47

2. M. serrata, Roxb. Fl. Ind. iii. 596; Brandis 409. Vern. *Karún, tút, káura, túlúkúl, soá, án, shla, chimu, kimu*, Pb.; *Kimu, himu*, Hind.

A large deciduous tree. Bark greyish brown. Sapwood small, white; heartwood yellow or brown, with a slight lustre, moderately hard. Annual rings distinctly marked by a line or irregular belt of moderate-sized and large pores. Pores frequently subdivided, filled with gum. In the outer portion of each annual ring the pores are small and moderate-sized, scanty, often arranged in groups. Medullary rays moderately broad.

North-West Himalaya between 4,000 and 9,000 feet.

Growth moderate, our specimens averaging 8 rings per inch of radius. Weight, 35 to 36 lbs. per cubic foot. It is often of very large size. Dr. Stewart noted several trees of 20 feet girth, and one at the Hindu temple at Barmaor, Chamba 7,000 feet, of 28 feet girth. It works well, does not warp, and takes a beautiful polish, shewing a golden lustre. It is used for troughs, agricultural implements and for cabinet-work. It is much esteemed by the Simla wood-carvers.

		lbs.
H 3174.	Dungagalli, Hazara, 7,000 feet	...
H 10.	Julung, Simla, 4,000 feet	36
H 28.	Madhan, Simla, 5,000 „	35
H 95.	Simla, 6,000 feet	36

3. M. cuspidata, Wall. *M. serrata*, Roxb.; Gamble 77. Vern. *Kimbu*, Nep.; *Nambyong*, Lepcha; *Singtok*, Bhutia; *Bola*, Ass.

A tall tree. Wood yellow, with yellowish brown heartwood, hard, close-grained, with a beautiful lustre. Annual rings marked by a white

line and sometimes by a continuous string of pores Pores uniformly distributed, moderate-sized to large, often oval and subdivided, each pore in a narrow ring of soft tissue, prominent on a vertical section Medullary rays fine and moderately broad; the distance between the rays generally equal to, or larger than, the transverse diameter of the pores. Medullary rays prominent on a radial section, giving the wood a markedly mottled appearance.

Valleys of the Outer Eastern Himalaya, from Sikkim to Assam

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over
The
been

much used for tea boxes, but would be extremely suitable It resembles that of *M serrata*, and would be good for planking, furniture and cabinet-work

		lbs
E 706	Great Rangit Valley, Darjeeling, 3,500 feet	42
E 3376.	" , " " 1,000 "	41
E 656	Bamunpokri, Darjeeling	48
E 2306	Eastern Duars, Assam	47
E 2196	Nowgong, Assam	42
E 2305	Kamrup, "	49

No 2965 is the "Fustic" *Maclura tinctoria*, D Don, from the West Indies, Central and South America, whose wood is used for dyeing different shades of yellow, derate sized to large, are fine, prominent, transverse diameter *aurantiaca*, Nuttall,

8. ARTOCARPUS, Linn.

About 8 Indian species *A calophylla*, Kurz, *A rufescens*, Miq, *A Gomeziana*, Wall, and *A rigida*, Bl (*A echinata*, Roxb. Fl Ind iii 527), are all trees described in Kurz ii 4 wood and gives a kind the "Bread Fruit" T Ceylon and Burma, Bengal

The wood of the species of *Artocarpus* here described is very uniform in character. Heartwood moderately hard to hard, sometimes yellow, seasons well, weighs between 30 and 50 lbs. Pores moderate-sized to large, often in circular light-coloured rings of softer tissue, prominent on a longitudinal section. Medullary rays fine to moderately broad, very distinct, the distance between the rays generally about equal to the transverse diameter of the pores

Fl. Ind. iii. 522; Beddome ccxix; 73 The Jack Tree Vern *Kan-* Uriya, Tel; *Phanás*, Mar., *Pilla*, , Kan.; *Teprong*, Gáro; *Peingnai*, Burm; *Cos*, Cingh

A large tree. Bark thick, blackish, deeply cracked. Heartwood yellow or rich yellowish brown, darkening on exposure, compact, even-grained, moderately hard, seasons well and takes a fine polish. Pores often oval and subdivided, moderate-sized to large, in irregular patches of soft tissue, which are often arranged in short oblique lines or

groups, sometimes filled with a white substance which is visible on a vertical section. Pores prominent on a vertical section. Medullary rays numerous, fine and moderately broad.

Cultivated throughout India, except in the northernmost part. Wild in the mountain forests of the Western Gháts, ascending to 4,000 feet (Beddome).

The growth appears to be very fast, but the rings are indistinct and difficult to count. The following experiments have been made to determine the weight and transverse strength:—

		Weight.	P =
Puckle in 1859 in Mysore (4 experiments), with bars 2′ × 1″ × 1″ found		42 lbs.	562
Skinner, No. 17, in 1862 in South India	„	44 „	788
Adrian Mendis, No. 16, in 1855, in *Ceylon*, with bars 2′ × 1″ × 1″	„	42 „	712
Wallich	„	42 „	...
„ in 1862 in Travancore	„	35 „	...
Warth in 1878 with specimens below given	„	40 „	...

The wood is largely used for carpentry, boxes and furniture, and is exported to Europe for cabinet work, turning and brush-backs. The wood yields a yellow dye used in Burma to dye the yellow clothes worn by "phoongies." The tenacious milky juice is used as birdlime. The fruit is very largely used all over India for food, but, except the seeds, rarely by Europeans. It has an unpleasant smell when ripe. The fruit in young trees is borne on the branches, in older trees on the trunk, and in very old trees near the root.

			lbs.
E	598.	Darjeeling Terai (young tree)	38
E	2414.	Siliguri, Bengal	41
W	756.	South Kanara	43
B	806.	Tharrawaddi, Burma	30
No.	9.	Salem Collection	42
No.	16.	Ceylon „	41

2. A. Lakoocha, Roxb. Fl. Ind. iii. 524; Beddome ccxix.; Brandis 426; Kurz ii. 433; Gamble 73. Vern. *Tiún*, *dheu*, *daheo*, Pb.; *Dahu*, *dhau*, *barhal*, *lakúch*, Hind.; *Dháo*, Kumaun; *Dephúl*, *dehua*, Beng.; *Dowa*, *chama*, *chamba*, Ass.; *Dawa*, Cachar; *Kamma regu*, *laku-chamma*, *nakka-renu*, Tel.; *Myouklouk*, Burm.; *Cauna-gona*, Cingh.

A large tree. Bark $\frac{1}{3}$ inch thick, dark grey, rough. Sapwood large, white, soft, perishable. Heartwood yellow, hard. Pores large, enclosed in rings of light coloured, soft tissue, uniformly distributed. Medullary rays fine and moderately broad, very distinct, prominent on a radial section.

Outer Hills of Kumaun, Sikkim, Eastern Bengal, Burma, evergreen forests of Western Gháts and Ceylon.

Growth fast, 3 to 4 rings per inch of radius. Weight, our specimens give on an average, 39·5 lbs. per cubic foot; Brandis in his Burma List of 1862, No. 92, gave 40 lbs. The wood seasons well, takes a good polish and is used for furniture and canoes. Mann says the bark is chewed in Assam. The male flower-heads are pickled and the fruit is eaten.

			lbs.
E	2445.	Siliguri, Bengal	48
E	794.	Kámrúp, Assam	36
E	1402.	Chittagong	43
W	740.	South Kanara	47
B	810.	Rangoon Division, Burma	30
B	2553.	Burma (1862)	39
No.	67.	Ceylon Collection (marked *Artocarpus* sp. Vern. *Patta-del*)	34

3. A. Chaplasha, Roxb. Fl. Ind. iii. 525; Brandis 426; Kurz ii. 432; Gamble 73. Vern. *Chaplash*, *chaplis*, Beng.; *Lut-ter*, Nep.; *Chram*, Gáro; *Sam*, Ass.; *Cham*, Cachar; *Pani*, *toponi*, Magh; *Toungpeingnai*, Burm.; *Kaita-dá*, And.

A lofty deciduous tree Bark of young trees smooth, light grey with dark blotches, of old trees dark brown, tuberculate, ⅓ inch thick Wood yellow to brown, moderately hard, even grained, rough, durable, seasons well Pores large and moderate-sized, uniformly distributed Medullary rays short, fine and moderately broad Pores frequently filled with a white substance

Eastern Bengal Burma and the Andaman Islands

Growth rather fast 5 to 6 rings per inch of radius Weight 36 8 for the average of our 14 specimens, Brandis Burma List of 1862, No 91 gives 39 lbs, No 92 gives 30 lbs No 15 Skinner (1862) (*Artocarpus echinatus* Vern *Toungpeingnai*) gives Weight = 63 lbs P = 672 Bennett (1872) gives Weight = 32 lbs P = 459 for Andaman wood. The wood seems to get harder and heavier as it gets older, two of our specimens from the Andaman Islands cut in 1866 and stored since then in Calcutta give respectively 46 and 52 lbs, and Skinner gives 63 lbs, but this is probably a mistake It is much used for canoes, in Sikkim and Assam for planking

The leaves

cus Robur,

			lbs
E	587	Khookloong Forest Darjeeling Terai (young)	30
E	629	Eastern Duars Assam	32
E	2301	Kamrup Assam	33
F	2186	Nowgong, „	35
E	721	Chittagong	33
B	2554	Burma (1862)	39
B	2693	Tavoy (Wallich, 1828)	37
B	2683	„ ( )	32
B	2204	Andaman Islands, (1866)	52
B	2211	„ , „	33
B	2289	„ , „	46
B	512	„ , „	34
B	2499	„ , (Home, 1874 Nos 4 and 5)	31 48

4. A. hirsuta, Lamk, Roxb Fl Ind iii 521, Beddome t 308, Brandis 426 Vern *Ayni, anjalli, aiyanepela*, Tam, *Aini, ansjeni*, Mal, *Hebalsu, heb halasu, hesswa, hessain*, Kan, *Hebalsu, pat-phanas, ran-phanas*, Mar

A lofty evergreen tree Heartwood hard to very hard, yellowish brown, durable, seasons well Pores moderate sized to large, enclosed in narrow rings of soft tissue, often filled with a white substance Medullary rays fine to moderately broad, wavy, very distinct

Everg

Growt　　ounting

Weight,　　average

34 lbs.　　coast for

house and ship building furniture and other purposes

			lbs
D	1090	Madura Madras	32
W	1219	North Kanara	31
W	744	South ,	39
W	755	, ,	41

(This last specimen differs by having very short moderately broad medullary rays and pores in irregular patches of soft texture, it may possibly be *A Lakoocha*)

5. A. nobilis, Thw Enum 262, Beddome t. 309 Vern *Del, aludel*, Cingh

A large tree Heartwood shining, moderately hard. Pores large filled with a white substance, prominent on a vertical section, and

groups, sometimes filled with a white substance which is visible on a vertical section. Pores prominent on a vertical section. Medullary rays numerous, fine and moderately broad.

Cultivated throughout India, except in the northernmost part. Wild in the mountain forests of the Western Ghâts, ascending to 4,000 feet (Beddome).

The growth appears to be very fast, but the rings are indistinct and difficult to count. The following experiments have been made to determine the weight and transverse strength:—

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Skinner, No. 17, in 1862 in South India	„ 44 „	788
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Wallich	„ 42 „	...
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Warth in 1878 with specimens below given	„ 40 „	...

The wood is largely used for carpentry, boxes and furniture, and is exported to Europe for cabinet work, turning and brush-backs. The wood yields a yellow dye used in Burma to dye the yellow clothes worn by "phoongies." The tenacious milky juice is used as birdlime. The fruit is very largely used all over India for food, but, except the seeds, rarely by Europeans. It has an unpleasant smell when ripe. The fruit in young trees is borne on the branches, in older trees on the trunk, and in very old trees near the root.

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W	756.	South Kanara	43
B	806.	Tharrawaddi, Burma	30
No.	9.	Salem Collection	42
No.	16.	Ceylon „	44

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A large tree. Bark ⅓ inch thick, dark grey, rough. Sapwood large, white, soft, perishable. Heartwood yellow, hard. Pores large, enclosed in rings of light coloured, soft tissue, uniformly distributed. Medullary rays fine and moderately broad, very distinct, prominent on a radial section.

Outer Hills of Kumaun, Sikkim, Eastern Bengal, Burma, evergreen forests of Western Ghâts and Ceylon.

Growth fast, 3 to 4 rings per inch of radius. Weight, our specimens give on an average, 39·5 lbs. per cubic foot; Brandis in his Burma List of 1862, No. 92, gave 40 lbs. The wood seasons well, takes a good polish and is used for furniture and canoes. Mann says the bark is chewed in Assam. The male flower-heads are pickled and the fruit is eaten.

			lbs.
E	2445.	Siliguri, Bengal	48
E	794.	Kámrúp, Assam	36
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3. A. Chaplasha, Roxb. Fl. Ind. iii. 525; Brandis 426; Kurz ii. 432; Gamble 73. Vern. *Chaplash, chaplis,* Beng.; *Lut-ter,* Nep.; *Chram,* Gáro; *Sam,* Ass.; *Cham,* Cachar; *Pani, toponi,* Magh; *Toungpeingnai,* Burm.; *Kaita-dá,* And.

A lofty deciduous tree Bark of young trees smooth, light grey with dark blotches, of old trees dark brown, tuberculate, ½ inch thick. Wood yellow to brown, moderately hard, even grained, rough, durable, seasons well Pores large and moderate-sized, uniformly distributed Medullary rays short, fine and moderately broad Pores frequently filled with a white substance

Eastern Bengal Burma and the Andaman Islands

Growth rather fast, 5 to 6 rings per inch of radius Weight 36 8 for the average of our 14 specimens, Brandis Burma List of 1862, No 91 gives 39 lbs, No 92 gives 30 lbs No 15 Skinner (1862) (*Artocarpus echinatus* Vern *Toungpeingnai*), gives Weight = 63 lbs, P = 672 Bennett (1872) gives Weight = 32 lbs, P = 459 for Andaman wood The wood seems to get harder and heavier as it gets older, two of our specimens from the Andaman Islands cut in 1866 and stored since then in Calcutta give respectively 46 and 52 lbs, and Skinner gives 63 lbs, but this is probably a mistake It is much used for canoes in Sikkim and Assam for planking, tea boxes and furniture Kurz says it gives a tenacious milky caoutchouc The leaves of young plants are pinnatifid resembling a gigantic hairy leaf of *Quercus Robur*, those of old trees are oblong, entire

			lbs.
E	587	Khookloong Forest, Darjeeling Terai (young)	30
E	629	Eastern Duars Assam	32
E	2301	Kamrup, Assam	33
E	2186	Nowgong ,,	35
E	721	Chittagong	33
B	2554	Burma (1862)	39
B	2693	Tavoy (Wallich, 1828)	37
B	2683	(,, ,)	32
B	2204	Andaman Islands, (1866)	52
B	2211	, , ,	33
B	2289	,, ,, ,,	46
B	512	, , ,	34
B	2499	, , (Home 1874 Nos 4 and 5)	31 / 48

4. A. hirsuta, Lamk, Roxb Fl Ind iii 521, Beddome t 308, Brandis 426 Vern *Ayni, anjalli, aiyanepela*, Tam, *Aini, ansjeni*, Mal, *Hebalsu, heb halasu, hesswa, hessain*, Kan, *Hebalsu, pat-phanas, ran-phanas*, Mar

A lofty evergreen tree Heartwood hard to very hard, yellowish brown, durable, seasons well Pores moderate sized to large, enclosed in narrow rings of soft tissue, often filled with a white substance Medullary rays fine to moderately broad, wavy, very distinct

Evergreen forests of th W — Gh) feet
Gro for proper counting
Weigh hree specimens average
34 lbs i the western coast for
house

			lbs
D	1090	Madura, Madras	32
W	1219	North Kanara	31
W	744	South ,	39
W	755	,, ,	41

(This last specimen differs by having very short moderately broad, medullary rays and pores in irregular patches of soft texture, it may possibly be *A Lakoocha*)

5. A. nobilis, Thw Enum 262, Beddome t. 309 Vern *Del, aludel*, Cingh

A large tree Heartwood shining, moderately hard Pores large filled with a white substance, prominent on a vertical section, and

thereby giving the wood an elegant mottled appearance. Medullary rays short, moderately broad; the distance between the rays being equal to the transverse diameter of the pores.

Ceylon.

Weight, Adrian Mendis' two experiments made in 1855 with bars 2 feet × 1 inch × 1 inch gave: No. 2, weight 51 lbs., P = 712; No. 21, weight 40 lbs., P = 528. The specimens, now again weighed, give 40 and 49 lbs. respectively. Wood used for canoes and furniture. The seeds are roasted and eaten by the Cinghalese.

		lbs.
No. 2.	Ceylon Collection marked *A. pubescens*	51
No. 21.	„ „ „ „	40

9. ANTIARIS, Lesch.

1. A. toxicaria, Lesch.; Kurz ii. 462. *A. innoxia*, Bl.; Beddome t. 307; Brandis 427. *A. saccidora*, Dalz. The Upas Tree. Vern. *Alli*, *netavil*, Tam.; *Jazúgri*, *karwat*, *jagúri*, Kan.; *Jasúnd*, Bombay; *Arayaangely*, Mal.; *Riti*, Cingh.; *Myah-seik*, Burm.

A gigantic evergreen tree attaining a height of 250 feet, with thick grey bark. Wood white, soft, even-grained. Annual rings faintly marked. Pores large and moderate-sized, often subdivided. Medullary rays moderately broad, undulating, uniform and equidistant; the distance between two rays generally equal to the transverse diameter of the pores, which are prominent on a vertical section.

Evergreen forests of Burma, the Western Ghâts and Ceylon.

Growth fast, 4 to 6 rings per inch of radius. Weight, 25 lbs. per cubic foot. Beddome says it is the largest tree in the forests of the western coast, and that it reaches 250 feet in height, with an enormous girth. It exudes a white poisonous resin used for poisoning arrows. The inner bark gives a good fibre which makes strong cordage; it is also stripped off whole from a branch or young tree to form sacks which are used to carry rice.

		lbs.
B 813.	Rangoon Division, Burma	25

Nos. E 408 from the Sundarbans, E 1294 from Cachar, and W 729 from South Kanara resemble this in structure.

10. FICUS, Linn.

A large genus containing more than 80 Indian species. They are trees or shrubs often climbing, but more often epiphytic, and some species are of enormous size. *F. tomentosa*, Willd.; Roxb. Fl. Ind. iii. 550; Beddome ccxxiii.; Brandis 414. Vern. *Petta-mari*, Tel, is a large tree of Banda, Behar, Central and Southern India. *F. Wightiana*, Wall.; Beddome ccxxii.; Brandis 414, is a large tree of Southern India. *F. mysorensis*, Roth.; Brandis 414; Kurz ii. 440; Gamble 73. Vern. *Sunkong*, Lepcha; *Goni*, Kan. is a large epiphytic tree of Sikkim, Martaban, Mysore and the Western Ghâts. *F. laccifera*, Roxb. Fl. Ind. iii. 545; Beddome ccxxiii.; Kurz ii. 441; Gamble 74. Vern. *Yokdúng*, Lepcha; *Prab, phegran*, Gáro; *Bur*, Ass.; *Nyoungben*, Burma, is a large epiphytic tree of the North-East Himalaya, Eastern Bengal, Burma, South India and the Andamans, giving India-rubber, but more sparingly and of not such good quality as that of *F. elastica*. *F. obtusifolia*, Roxb. Fl. Ind. iii. 546; Kurz ii. 443; Gamble 74. Vern. *Krapchi*, Mechi; *Nyoung-kyap*, Burm.; *Date*, Magh, is a small-leaved epiphytic tree of Northern and Eastern Bengal and Burma, also yielding a moderately good variety of caoutchouc. *F. triloba*, Ham.; Brandis 423 (*F. hirsuta*, *F. hirta*, Roxb. Fl. Ind. iii. 528-531. *F. Roxburghii*, Miq.; Gamble 75) Vern. *Dungra*, *khura dumúr*, Beng.; *Kasreto*, Nep.; *Gyasay*, Lepcha; *Mhow*, *man*, Ass., is a handsome small tree of

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f
I
gong

F Carica Linn Brandis 418 The Fig Vern *Anjir* Hind *Kimri fagu, faguri figari* Pb is cultivated in the plains of North West India and hills up to 5 000 feet but the produce is generally poor Mathieu El For page 251 gives the weight of the wood at 34 to 45 lbs per cubic foot The wood is soft, white with a

y numerous
very great
forest interest

The structure of all species of *Ficus* is exceedingly uniform Wood generally soft, marked by alternate bands of soft and firm tissue, no heartwood Pores small to large, scanty, except in the wood of the scandent species, which is porous as usual in the case of climbers Medullary rays generally of two classes, fine and moderately broad As far as the materials at our disposal permit us to venture upon a classification, we should be inclined to say that there are two types which differ more in the general appearance of the wood than in structure *Ficus religiosa, elastica, retusa, Cunia, nemoralis* and *virgata* have wood of plain, smooth appearance, which, though the medullary rays are apparent on a radial section, is not mottled and streaked as in the other species The species with rough, mottled and streaked wood are *Ficus bengalensis, infectoria, cordifolia, comosa, regia, glomerata* and *Roxburghii* *Ficus virgata* differs from all the rest by having white, more compact wood *F parasitica* has the large pores of a climber

1 F bengalensis, Linn, Beddome cexxii, Brandis 412, Kurz ii. 440, Gamble 73 *F indica*, Roxb Fl Ind iii 539 The Banyan Vern *Bor, bar, ber, bargat*, Hind, *Bur, but*, Beng, *Boru*, Uriya, *Borhar*, Nep, *Kangji*, Lepcha, *Kanket*, Garo, *Bot*, Ass, *Barelli*, Gondi, *Wora*, Kurku, *Ala*, Tam, *Marri peddi marri*, Tel, *Ahlada, aladamara, ala*, Kan, *Peralu*, Mal, *War, vada*, Mar, *Maha nuga*, Cingh, *Pyee-nyoung*, Burm

A large evergreen tree, throwing down numerous aerial roots from the branches Bark ½ inch thick, greyish white, smooth, exfoliating in small irregular plates Wood grey, moderately hard, no heartwood Pores scanty, moderate sized, joined by narrow, wavy, concentric bands of soft tissue alternating with broader bands of firmer tissue and darker colour Medullary rays fine, equidistant, prominent On a radial section pores and medullary rays distinctly marked, giving the wood a mottled appearance

Planted by Hindoos throughout India up to 4 000 feet, wild in the Sub Himalayan tract Bengal and Central India

The rate of growth is not distinguishable by means of the annual rings, but it is known that it is very fast The tree sends down aerial roots from the branches, these root in the ground and grow into separate trunks which serve as supports for the branches and as feedeers for the tree which thus largely increases in spread of foliage Roxburgh states that he saw some trees with fully 500 yards circumference round the spread of branches and about 100 feet high Brandis says that many

villages situated in fertile valleys among the mountains. Balfour says that Marsden mentions a tree near Patna having a diameter of 363 to 375 feet of spread, circumference of shadow 1,116 feet, with 50 to 60 principal stems. The well-known tree in the Botanic Gardens, Calcutta, which was ascertained by Falconer to have grown in 1782 from a seed deposited in the crown of a date palm, and which is consequently now 98 years old, measured when examined by Falconer in 1831, Hooker in 1847, and Balfour in 1863. 300 feet in diameter of spread and 80 feet in height. It has since suffered severely in the cyclones of 1864 and 1867. Brandis met with a tree at Chicholi in Hoshungabad district, Central Provinces, 85 feet high with a diameter of 275 feet, and occupying an area of $1\frac{1}{2}$ acres. Its aërial roots were not, as usual in cultivaiion, assisted by bamboos, but small mounds of earth were heaped up to meet and receive them.

Weight, Skinner (No. 70) gives 36 lbs.; our specimens weigh 38 and 39 lbs. per cubic foot. Skinner gives P = 600.

The wood is of little value, but is durable under water, and therefore used for well curbs. It is sometimes used for boxes and door panels. The wood of the drops is stronger and is used for tent poles. cart yokes and banghy poles. The bark and small root drops give a coarse fibre for rope-making. Five specimens were sent to the 1878 Paris Exhibition from Berar (No. C 981). The milky juice is made into birdlime, the leaves are used as plates, and the fibre is used for slow matches by the Sikhs. Lac is sometimes collected on it, the leaves are used to cure bruises, the bark in native medicine, and the fruit is sometimes eaten. It is a common avenue tree, and being evergreen, fast-growing and easily propagated by large cuttings is very useful for planting on road-sides. Cuttings, 8 to 10 feet long, planted in July, succeed well. The *Gori* or *Deomuga* silkworm (*Bombyx religiosa*) feeds on its leaves in Assam. It is one of the epiphytic species of *Ficus*, which do so much harm to valuable timber trees in the forests, and which often has to be cut.

		lbs.
C 1150.	Ahiri Reserve, Central Provinces	38
C 836.	Bairagarh Reserve, Berar	39
C 2813.	Melghát, Berar	...

2. **F. infectoria**, Willd.; Roxb. Fl. Ind. iii. 551; Beddome cccxxii., Brandis 414; Kurz ii. 446; Gamble 75. *F. venosa*, Ham. Vern. *War, batbar, jangli pipli, palakh, trimbal*, Pb.; *Pilkhan, kahimmal, ramanjír, pákhar, pakri, keol, kaim, khabar*, Hind.; *Pákar*, Beng.; *Safed kabra*, Nep.; *Kangji*, Lepcha; *Prab*, Gáro; *Serilli*, Gondi; *Pepere*, Kurku; *Jovi, kall-alun*, Tam.; *Jewi, yuri*, Tel.; *Tsjakela*, Mal.; *Bassari*, Tel.; *Kari basri, bassari*, Kan.; *Nyoungchin*, Burm.

A large tree. Bark $\frac{1}{2}$ inch thick, greenish grey, smooth, exfoliating irregularly in flakes and patches. Wood grey, moderately hard. Pores scanty, large, often subdivided, joined by narrow concentric bands of soft tissue, which alternate with broader bands of firmer texture. Medullary rays uniform, moderately broad, equidistant, prominent on a radial section.

Suliman and Salt Ranges, Outer Himalaya ascending to 5,000 feet, Bengal, Burma, Central India, Western Coast and Ceylon.

Growth rapid. Weight: according to Brandis 30 lbs.; our specimens give an average of 34 lbs. It is often found as an epiphyte on other trees, but does not send down numerous roots like the Banyan, though it often has one or two aërial roots. It is often planted in avenues. It is common in the forests; but the wood is not durable. It is used in Assam and Cachar to make charcoal. The young shoots are eaten in curries, and the leaves make good elephant fodder. The bark gives a fibre good for rope. (No. C 982 from Berar was a fine specimen.)

		lbs,
P 911.	Salt Range	31
C 1166.	Ahiri Reserve, Central Provinces	37
C 838.	Bairagarh Reserve, Berar	34
C 2808.	Melghát, Berar	...

3. **F. religiosa**, Linn.; Roxb. Fl. Ind. iii. 547; Beddome t. 314;

Brandis 415, Kurz ii 448, Gamble 75 The Peepul Vern. *Pipal*, Hind, *Aswat, asud*, Beng, *Pipli*, Nep, *Bor-bur*, Cachar, *Arasa*, Tam, *Rai, raiga, ragi, rai i*, Tel, *Ali*, Gondi, *Pipri*, Kurku, *Rangi, basri*, Kan, *Bo*, Cingh, *Nyoungbandi*, Burm.

A large tree Bark grey, nearly ½ inch thick, exfoliating in rounded irregular flakes of varying size, often leaving rounded depressions Wood greyish white, moderately hard Pores moderate sized to large, often subdivided, joined by narrow bands of soft tissue, which alternate with broader bands of firmer substance Medullary rays uniform and equidistant, moderately broad, visible on a radial section, but not giving the wood a markedly mottled appearance

Wild in the Sub Himalayan tract Bengal and Central India

Growth very fast It is often planted as an avenue tree for which it is very suitable it grows well and quickly either from cuttings or seedlings The weight and transverse strength have been determined by the following experiments —

		Weight	P
Cunningham at Gwalior in 1854 in two experiments with bars 2 × 1 × 1	found	44	458
Skinner in Madras in 1862 (No 72)		34	584
Warth with our six specimens in 1878		34 7	...

The tree being sacred is rarely felled the wood is used for fuel for packing cases and in Cachar for charcoal The leaves and branches are good elephant fodder the

on its leaves in Assam

			lbs
P	893	Multan	45
O	533	Dehra Dun	31
O	538		31
O	543		23
C	1168	Abiri Reserve Central Provinces	44
C	837	Bamgarh Reserve Central Provinces	34
C	2814	Melghat Berar	

4 **F cordifolia**, Roxb Fl Ind iii 548, Brandis 416, Gamble 75 *F Rumphii*, Kurz ii 448 Vern *Rumbal, palak, badha, pilkhan*, Pb, *Kabar, gajiun, gajna, pipal, gagjaira, pakar, khabar*, Hind, *Kabai pipal*, Kumaun, *Gai aswát*, Beng, *Pakar*, Nep, *Pakri*, Ass, *Sat-bur*, Cachar, *Prab*, Gáro, *Paras pipal*, Ajmere, *Pair*, Mar, *Nyounqpyoo*, Burm

A large deciduous tree Bark smooth, ½ inch thick Wood very soft, spongy Pores oval, arranged in wavy, concentric bands, alternating with bands of firmer texture and of the same width Medullary rays fine, uniform, equidistant, very marked on a radial section, giving the wood a beautifully mottled appearance

Outer Himalaya from the Chenab eastwards ascending to 5 000 feet Bengal, Central India and Burma

Weight 27 lbs per cubic foot Wood used in Cachar for charcoal for tea manufacture It is generally epiphytic and is then very destructive to timber trees In Assam the lac insect is reared on it (Mann) The fruit is eaten and the leaves and branches used for cattle fodder

			lbs
H	605	Chitul Forest Kangra	27
P	3224	Nagpahar Ajmere	...

F 580 20 lbs sent from the Darjeeling Terai under the name of *Nucaro* and F 710 (27 lbs) sent from Chittagong under those of *Hyalja* Beng, *Choupaka*, Magh resemble this species in structure

5. **F. retusa**, Linn.; Beddome cccxiii.; Brandis 417; Kurz ii. 44.; Gamble 75. *F. nitida*, Thunb.; Wight Ic. t. 642. *F. Benjamina*, Willd.; Roxb. Fl. Ind. iii. 550. Vern. *Kamrup, zir*, Beng.; *Jamu*, Nep.; *Sitnyok*, Lepcha; *Yerra juvi*, Tel.; *Pilála*, Kan.; *Nyoungop, nyoungthabyeh*, Burm.

A large evergreen tree. Wood light reddish grey, close-grained, moderately hard, beautifully mottled. Pores moderate-sized, often subdivided, scanty. Medullary rays short, moderately broad. Numerous narrow, wavy, red, concentric bands of soft tissue alternating with broader bands of firmer texture.

Kumaun, Bengal, South India, Burma and the Andaman Islands.

Weight, 40 lbs. per cubic foot. Wood used for fuel, but as it is very prettily grained it might be found valuable for tables, door panels and other purposes. It is often planted as an avenue tree, and for this, from its dense shade, it is very suitable. It is often epiphytic.

		lbs.
E 401.	Sundarbans	40
B 2278.	Andaman Islands	40
No. 45.	Ceylon Collection (*Ficus* sp., *Kiripelle*, Cingh.) . . .	42

6. **F. elastica**, Bl.; Roxb. Fl. Ind. iii. 541; Brandis 417; Kurz ii. 444; Gamble 74. The India-rubber Fig or Caoutchouc Tree. *Bor, attah bar*, Beng., Ass.; *Kagiri, kasmir*, Khasia; *Lesu*, Nep.; *Yok*, Lepcha; *Rauket*, Gáro.

A large evergreen tree, throwing down numerous aërial roots from the branches. Bark grey or reddish brown, smooth. Wood white or light brown. Pores moderate-sized, scanty; narrow belts of soft tissue alternating with broad belts of firmer texture and darker colour. Medullary rays fine and very fine, numerous, unequally distributed.

Outer North-East Himalaya from the Mechi river eastwards, Assam, Cachar, mountains east of Bengal and Arracan. It is found in the vicinity of the Irrawaddy river as far south as 25° north latitude, but it will probably be found further south on hills east of Arracan.

Weight, 43 lbs. per cubic foot. The wood is not used.

The tree is usually epiphytic, the seeds generally germinating at the summit of tall forest trees, where the seedlings can get light. It is often of very great height, trees 100 to 120 feet high being not unusual. It sends down innumerable aërial roots which have a reddish-brown bark, peeling off in small thin narrow strips or flakes; and these roots often extend considerable distances, giving a great spread to the tree. In Brandis' Forest Flora the measurements of a tree described by Griffith (1838) are given; these are:

Height, 100 feet.
Circumference of main trunk, 74 feet.
" of supports, 120 feet.
" of area covered by the branches, 610 feet.

Mann in his report of 1875 gives the following measurements for a tree at Tezpur aged 32 years, and having over 100 aerial roots:

Height 110 feet.
Diameter of crown 140 feet.
Circumference of stem with central supports 70 feet.

The tree is tapped by means of slanting notches made in the stem, aërial roots and roots about 12 inches apart. The milk is allowed to collect and coagulate in these notches for two or three days, after which time the hard India-rubber in each notch is easily collected by being pulled out in a strip. The tree will not bear yearly tapping, once in three years is as much as it will stand; if tapped yearly, it is liable to die off, as did many of the trees in Darjeeling after heavy tapping in 1871, 1872 and 1873. Those which then survived have not yet (1880) recovered sufficiently to be fit for tapping again.

It is easily propagated from seed in small beds thatched over and fenced round

to keep out the sun, and provided with small trenches filled with water By these means a constant hot moist atmosphere is secured and seedlings do well, but the

division The different modes used were the following —

"*First* —On beds covered with broken bricks, half of which was sown with entire fruit of figs and the other half with the fruit broken up or rubbed into powder

nated in the middle of April Germination took place best on the broken bricks, next best on the charcoal and least on the earth The seedlings on the charcoal stood the heavy rains best, those

perished They require light and sun, but as a attention than cuttings, fore they are a year old and excessive moisture cause of the mischief was recognised

"The number saved amounted, however, to about 1,200, which were on an average of the undermentioned sizes as they grew —

On the 27th June 1874 $\frac{9}{10}$ths of an inch
" 12th August 1874, 1$\frac{2}{10}$ths inch
" 10th September 1874 5$\frac{7}{10}$ths inches
" 21st April 1875, 2 feet 10 inches

"It should here be mentioned that the last of these was a seedling which has been left undisturbed in the seed bed, and was exceptionally vigorous in growth

And Dr Schlich says "At Bamunpokri nine nursery beds were prepared, three with common garden soil, three with broken bricks, and three with charcoal, and all intersected by irrigation trenches, thus keeping the soil thoroughly moist by percolation The seed was collected in September 1874, and sown in that month and in October partly in whole figs, and partly crumbled up by the hand The beds were then shaded by thatch, raised 2 feet above the ground on the south, and 3 feet on the north, and the sides were closed in with mats which could be removed at will.

"From four to six weeks after sowing the seeds germinated profusely, best of all in the garden soil, next best on the broken bricks, and last, though still pretty well, on the charcoal, they have thriven well, and are now up to 5 inches high, with leaves up to 2 inches long"*

The propagation by cuttings is still easier, but the cuttings must be from young fleshy shoots, such as are obtained by pollarding several branches of an old tree and allowing them to send out shoots In Sikkim and Assam plants grown from seedlings or cuttings have succeeded either planted directly in the ground or in baskets of

* Many of these trees are now (1880) 15 to 20 feet high have many aërial roots and a considerable girth of main stem The plantation made of them is so dense as to be almost impenetrable and to exclude all other vegetation

forest, and trees were planted out on these lines at distances of 50 feet. The width of lines proved insufficient as soon as the rains set in, and the excessive shade and drip from the trees on either side of the line proved injurious and in many cases fatal to the plants. The planting on split stumps of trees and in earthenware rings, placed with the widest opening on stumps was suggested by the Chief Commissioner and proved very successful in low situations, counteracting the excessive wet on the ground; but vigorous growth was not insured until more light was admitted. All the lines of last year's plantation were therefore opened to 40 feet in width, and the effect on the young trees has already been most beneficial, so that, although it is only the commencement of the growing season, nothing could surpass the vigour and healthy appearance of the trees, and so far as the planting on lines opened out through the forest goes it certainly is a perfect success. The ground on these lines was not cleared except just around the plants, but the opening out of bridle-paths has become necessary to save time in going over the plants, since frequent inspection is the only way to prevent any vacancies remaining in the plantation."

		lbs.
E 2449.	Chawa Jhora, Sivoke, Darjeeling	43

7. **F. comosa,** Roxb. Fl. Ind. iii. 552; Beddome ccxxiii.; Gamble 74. *F. Benjamina,* Linn. var. *comosa,* Kurz ii. 446. Vern. *Kabra,* Nep.; *Kunhip,* Lepcha; *Juri pakri,* Ass.; *Putra-juvi,* Tel.

A moderate-sized, evergreen, often epiphytic tree with thin grey bark. Wood grey, beautifully mottled, moderately hard. Pores large, often subdivided, scanty. Medullary rays fine, numerous. Numerous concentric bands of soft tissue alternating with broader bands of firmer texture.

Bengal, Burma, mountains of the eastern side of the peninsula, Tinnevelly.

A very pretty small-leaved fig. Weight, 34 lbs. per cubic foot. Lac is produced on it in Assam (Mann).

		lbs.
E 588.	Bamunpokri, Darjeeling	34

8. **F. virgata,** Roxb. Fl. Ind. iii. 530; Brandis 419. *F. caricoides,* Roxb. Fl. Ind. iii. 529. Vern. *Anjir, inzar,* Afg.; *Fagu, fagóra, dudhi, dhura, phedu, kak, daholia* (Hills), *fagwara, thapur* (Plains), Pb.; *Gúlar, khabára, anjiri, beru, bedu,* Hind.

A moderate-sized tree. Bark grey, smooth. Wood white, close and even-grained, moderately hard. Pores small and moderate-sized, often oval and subdivided. Numerous wavy concentric bands of soft tissue, alternating with bands of equal width of firmer tissue. Medullary rays fine and moderately broad, unequally distributed. The distance between the rays is generally less than the transverse diameter of the pores.

Suliman and Salt Ranges, Outer Himalaya eastward to Nepal, ascending to 6,000 feet.

Weight, 39 lbs. per cubic foot. It often grows to a tolerably large size, reaching to 10 feet in girth. The leaves are lopped for cattle fodder, and the fruit is eaten in the Punjab hills.

		lbs.
P 910.	Salt Range	41
H 607.	Chitul Forest, Kangra	38
H 156.	Bhajji, Simla, 3,000 feet	39

9. **F. nemoralis,** Wall.; Brandis 424.

A moderate-sized tree with smooth grey bark. Wood white, moderately hard, close-grained. Pores small and moderate-sized, in groups and short radial lines. Medullary rays fine and moderately broad. Narrow white wavy bands of soft texture alternating with belts of firmer wood.

Outer Himalaya from the Jhelum to Sikkim ascending to 7 000 feet Weight 38 lbs per cubic foot The leaves are lopped for cattle fodder

		lbs
H 3080	Gowai, Simla, 6 000 feet	38

10. F. foveolata, Wall , Brandis 423, Gamble 75 Vern *Grelu,* Simla, *Makieru,* Kunawai, *Dudila,* Nep , *Taksot,* Lepcha (It is probably *F reticulata,* Miq , of Stewart's Punjab Plants)

An evergreen scandent shrub Wood light brown, soft, very porous Pores small to very large, very numerous Medullary rays fine, bending, the distance between the rays being less than the transverse diameter of the pores Numerous concentric bands of soft texture between the pores

Himalaya from the Sutlej to Bhutan Khasia Hills We ght 38 lbs per cubic foot

		lbs
H 2833	The Glen Simla 6 000 feet	38

11 F. Cunia, Buch , Roxb Fl Ind iii 561, Beddome ccxxiv , Brandis 421, Kurz ii 461, Gamble 76 Vern *Khewnau, khurhui kassæ, ghwi* Hind , *Kunia,* Kumaun, *Kanhya,* Nep , *Kavai, palkai, taikrau,* Mechi, *Sangji,* Lepcha, *Dumbur, jagya domur,* Beng , *Jonua, sodoi,* Magh, *Ye kha ong,* Burm

A moderate sized tree Wood rough, moderately hard, greyish brown Pores small and moderate sized joined by narrow concentric bands which alternate with broader bands of firmer texture, over which a portion of the pores are scattered Medullary rays fine, equidistant

Sub Himalayan tract from the Chenab eastwards ascending to 4 000 feet Bengal

		lbs
O 1365	Gonda Oudh	36
E 583	Bamunpokri Darjeeling Terai	36
E 1953	Chittagong	22

12 F glomerata, Roxb Fl Ind iii 558, Beddome ccxxiv , Brandis 422, Kurz ii 458, Gamble 76 Vern *Kathgular, krumbal, kakammal, dadhuri,* Pb , *Gulai, paroa, lelka, umar, umrai, tue,* Hind , *Dumri,* Nep , *Tkhongtay,* [illegible] Uriya, *Thoja,* Gondi, *Alawi,* Kui [illegible] *idi, mari,* Tel , *Kulla kith,* Kan , [illegible]

A large tree Bark ½ inch thick, smooth reddish brown, with a few large cracks Wood grey, soft Pores large, joined by narrow concentric bands of soft tissue, which alternate with bands of firmer tissue and darker colour Medullary rays moderately broad, equidistant Wood mottled on a longitudinal section

[illegible] Burma [illegible] lam s two ex [illegible] is may be the [illegible] and P = 583 [illegible] eq iently used [illegible] el for cattle [illegible] medicine a il

the ripe fruit is eaten and is good either raw or stewed

		lbs.
C 1138.	Ahiri Reserve, Central Provinces	...
C 839.	Bairagarh Reserve, Berar	25
C 2796.	Melghát, Berar	...
E 643.	Bamunpokri, Darjeeling Terai	25

13. F. Roxburghii, Wall.; Brandis 422; Kurz ii. 460. *F. macrophylla,* Roxb. Fl. Ind. iii. 556; Gamble 75. Vern. *Urbúl, urmúl, barbaru, túsi, trimbal, tirmal, trímal, tirmi, tiamle,* Pb.; *Trimmal, timal, timla,* Hind.; *Kasrekan,* Nep.; *Kundoung,* Lepcha; *Demúr,* Beng.; *Sapai,* Magh; *Sin-tha-hpan,* Burm.

A moderate-sized tree with grey warty bark. Wood reddish grey, moderately hard. Pores moderate-sized and large, often subdivided, joined by broad bands of soft tissue, alternating with darker bands of firmer texture, and of the same width, in which a few pores are found scattered. Medullary rays fine to broad, short, very prominent on a radial section, giving the wood a handsome mottled appearance.

Outer Himalaya from the Indus eastward, ascending to 6,000 feet, Sylhet, Chittagong, and Burma.

Weight, 34 lbs. The fruit is eaten and is good. The leaves are used for fodder.

		lbs.
H 606.	Chital Forest, Kangra	34

P 149 from Sainj, near Simla, 4,000 feet, Vern. *Dudela* (*Ficus glomerata*), resembles this species most. Weight, 34 lbs.

14. F. regia, Miq.; Kurz ii. 459; Gamble 76. Vern. *Neverra,* Nep.

An evergreen tree with grey bark. Wood soft, spongy. Pores scanty, moderate-sized. Narrow bands of soft tissue alternating with broader bands of firm texture. Medullary rays short, moderately broad, very prominent on a radial section, giving the wood a mottled appearance.

North-East Himalaya and Burma.

		lbs.
E 689.	Sepoydura Forest, Darjeeling, 5,500 feet	29

15. F. hispida, Linn. f.; Beddome ccxxiv.; Brandis 423; Kurz ii. 460; Gamble 76. *F. oppositifolia,* Roxb. Fl. Ind. iii. 561. *F. dæmona;* König; Roxb. Ic. 562. Vern. *Dadúri, degar, rúmbal,* Pb.; *Kagsha, gobla, totmila, kat gularia, konea dumbar,* Hind.; *Dhedu mera,* Panch Mehals; *Kharwa,* Nep.; *Taksot,* Lepcha; *Dumar, kako-dumar,* Beng.; *Poksha,* Mechi; *Khoskadumar,* Ass.; *Shakab,* Gáro; *Boda-mamadi, bummarri, bamári,* Tel.; *Katumer, bomair,* Gondi; *Koreh,* Kurku; *Maiu-lok,* Magh; *Kadot,* Burm.

A moderate-sized tree. Bark $\frac{1}{5}$ inch thick, grey, peeling off in irregular flakes, with slight horizontal ribs encircling the tree. Wood soft, dirty grey, no heartwood, no annual rings. Pores scanty, moderate-sized, often oval and subdivided. The pores are mostly contained in regular concentric bands of soft tissue, which alternate with firmer bands of equal width and darker colour. Medullary rays moderately broad and fine, prominent as long narrow bands on a radial section.

Outer Himalaya from the Chenab eastwards, ascending to 3,500 feet, Bengal, Central and South India, Burma and the Andaman Islands.

Growth fast, a round in the Bengal Forest Museum shews 3 rings per inch of radius Weight Kyd s Assam experiments give 25 lbs , our specimen weighs 35 lbs Kyd gives P = 360 The leaves are lopped for cattle fodder This species is easily recognised by its opposite leaves

		lbs
C 1180	Ahiri Reserve, Central Provinces .	. .
C 2803	Melghat Berar	
E 2450	Bamunpol ri, Darjeeling Terai	. 35

11 ULMUS, Linn

Roxb Fl

4 000 and

European

the Wych

scribed in

Brandis, pp 431 to 433

Heartwood grey Annual rings consisting of an inner porous belt with numerous large pores, and an outer belt of firm texture with small pores arranged in wavy concentric or oblique lines Medullary rays moderately broad Pores marked on a longitudinal section The wood of *U lancifolia* and *U integrifolia* differs from that of the European and North-West Indian elms

1. U. Wallichiana, Planch , Brandis 432 Vern *Kain, bren, brera, brankul, amrai, marari, mariun, marazh, makshaii, manderung, maldung, shko, kummai, hembra,* Pb , *Mored, pabuna, chambar maya,* Hind

A large deciduous tree Bark grey, rough, with diagonal cracks, exfoliating in diamond shaped scales Heartwood greyish brown, moderately hard Annual rings marked by a soft porous belt in the spring wood, the outer part of the annual ring consisting of firm and very hard tissue Pores in spring wood moderate-sized and large, closely packed, in the autumn wood small and very small, arranged in oblique, undulating, concentric lines Medullary rays fine and moderately broad, marked on a radial section as long narrow bands

North West Himalaya from the Indus to Nepal between 3 500 and 10 000 feet Growth slow countings on our three specimens gave H 59 15 rings, H 122, 10½ rings and H 917, 25½ rings per inch of radius, the average of the three is therefore about 17 rings per inch of radius The tree often reaches a large size, 80 to 90 feet in height, with a girth of 16 to 21 feet The average weight of our three specimens is 36 lbs per cubic foot The wood is used locally in places where deodar is not available and *Pinus excelsa* not very abundant such as in Hazara where it finds a ready sale at from Rs 3 to Rs 5 per tree It certainly seems worthy of more attention The bark contains a strong fibre which is made into cordage, sandals and slow matches The leaves are lopped for cattle fodder

		lbs
H 59	Nagkanda Simla, 8 000 feet . .	40
H 122	Manali, Kulu 7,000 feet	35
H 917	Hazara 7 000 feet .	32
H 3175	Dungagali, Hazara, 7 000 feet .	.

2 U sp , Brandis 433 (note under *U campestris*) Vern *Iumbok,* Ladak , *Bian, brahmi, kai, morún, maral, mauru, mannu, mandu, mamji, marn, meiu, merinu, bhamji, bhamni, chipal,* Pb

(On specimens of this tree sent to Kew lately Prof Oliver reported This Elm is the *U pedunculata,* Fouq of the Herbarium Hooker fil and Thomson I think it is *not* the *U pedunculata,* Fouq , of Central Europe and Asia, but probably a distinct species near to *U campestris*)

A shrub or small tree. Bark brown, surface whitish, between deep, dark-coloured, longitudinal, regular furrows, running diagonally into each other. Wood grey with darker streaks, hard, otherwise the structure is the same as that of *U. Wallichiana*.

Kulu and Hazara.

Growth, our specimens shewed a slightly faster rate than those of *U. Wallichiana*. No. H 123 gave 16 and H 918, 9 rings per inch of radius. Weight, 34 to 37 lbs. per cubic foot. Wood not used, but considered better than that of *U. Wallichiana;* our specimens, however, do not shew this superiority.

			lbs.
H	123.	Manali, Kulu, 7,000 feet	37
H	918.	Hazara, 7,000 feet	34
H	3164.	Dungagalli, Hazara, 7,000 feet	...

3. **U. lancifolia**, Roxb. Fl. Ind. ii. 66; Kurz ii. 473; Gamble 72. Vern. *Lapi*, Nep.; *Thalai*, Burm.

A large tree. Bark brown, thick. Wood light red, hard. Pores small, usually surrounded by white tissue and joined by white concentric lines which are sometimes broken. Medullary rays fine to moderately broad, the distance between them about equal to the transverse diameter of the pores.

North-East Himalaya from Sikkim to Assam, Chittagong and Burma.

E 3343. Singtam, Darjeeling, 1,500 feet.

4. **U. integrifolia**, Roxb. Fl. Ind. ii. 68; Beddome t. 310; Brandis 431; Kurz ii. 473. *Holoptelea integrifolia*, Planch.; DC. Prodr. xvii. 164; Wight Ic., t. 1968. Vern. *Papri, khulen, arján, rajáin, kachám*, Pb.; *Papar, kanju*, Kumaun; *Papri, dhamna, kúnj, karanji, chilbil, chilmil, kúmba, kúnja náli, kandru, begana*, Hind.; *Chilla* Banda; *Karinji*, Gondi; *Karanjel*, Kurku; *Aya*, Tam.; *Namli, navili, nali, pedda-nowli-eragu*, Tel.; *Wawali*, Mar.; *Ras bija*, Kan.; *Thapsi*, Mysore, Coorg; *Kaládri*, Hassan; *Dadahirilla*, Cingh.; *Myoukseit*, Burm.

A large deciduous tree. Bark ⅓ inch thick, whitish grey, exfoliating in long, irregular flakes, soft, with an offensive smell when fresh, like the leaves and branchlets. Wood light yellowish grey, moderately hard, no heartwood. Annual rings indistinct. Pores small, uniformly distributed, joined by very fine and often faint lines of soft texture, frequently filled with a snow-white substance, marked on a vertical section. Medullary rays fine, undulating, uniform, equidistant, visible on a radial section; the distance between the rays equal to the transverse diameter of the pores.

Sub-Himalayan tract from the Beas eastwards, Central and South India, Burma.

Growth moderately fast, averaging 6 rings per inch of radius, some specimens shewing as little as 2 rings. Weight, 39 lbs. per cubic foot. The wood is used for building, carts, and carving. The leaves are lopped for cattle fodder. An oil is extracted from the seed in the Melghát.

			lbs.
P	445.	Ajmere	42
O	264.	Garhwal (1868)	46
O	3002.	„ (1874)	41
O	392.	Oudh	34
C	1148.	Ahiri Reserve, Central Provinces	37
C	1181.	„ „ „	37
B	1416.	Tharrawaddi, Burma	42
B	1419.	„ „	41

12 CELTIS, Tournefort

Contains about 8 species which are very difficult to distinguish cf Brandis, p 429 A rough key to the general characters of the leaves is however given, it may be useful in ascertaining the species

Leaves evergreen entire	*C Wightii*
Leaves semi-deciduous serrate	*C cinnamomea*
Leaves deciduous serrate—	
	C eriocarpa
	C Hamiltonii
Leaves penniveined—	
Leaves of perigonium obtuse	*C australis*
Leaves of perigonium acute	*C tetrandra*
Leaves with 3 nerves—	
Leaves sub-cordate at base	*C Roxburghii*
Leaves rhomboid	*C caucasica*

C cinnamomea Ldl, Kurz ii 472 is a tree of Northern and Eastern Bengal,

Wood light-coloured, moderately hard, no heartwood, seasons well Annual rings in the species of Europe, Northern India and Bengal, distinctly marked by belts of large pores The pores in the outer portion of the annual ring small, and generally arranged in groups or oblique tails

1 C Wightii, Planchon, Beddome ccxviii, Wight Ic t 1969 *Solenostigma Wightii*, Bl, Kurz ii 471 Vern *Vella thorasay*, Tam, *Tella-kaka-mushti*, Tel

A small evergreen tree Wood greyish white, very hard, close-grained Annual rings indistinctly marked by a narrow belt without pores Pores small, enclosed in narrow, undulating, concentric, interrupted lines of soft tissue Medullary rays fine, numerous, uniform and equidistant

Mountains of South India Andaman Islands
Weight 53 lbs per cubic foot

		lbs
D 1089	Madura Madras	53

2. C. australis, Linn, Brandis 428 Vern *Kharak*, Simla, Kumaun, *Tagho, takhum*, Afg,

A moderate-sized deciduous tree Bark bluish grey Wood grey or yellowish grey, with irregular streaks of darker colour Annual rings marked by an irregular belt of moderate-sized and large pores Pores moderate sized and large, gradually getting smaller towards the outer limit of each annual ring, where they are very small and arranged in wavy, interrupted, concentric lines Medullary rays moderately broad and fine

Suliman and Salt Ranges Himalaya from the Indus to Bhutan ascending to 8 500 feet Khasia Hills

Growth moderate 8 to 9 rings per inch of radius Weight, 47 lbs per cubic foot, Mathieu Fl For, p 257, gives 37 to 50 lbs The wood is tough and strong and is

used for oars, whip handles and for other purposes requiring toughness and elasticity. The tree is largely planted about villages in the North-West Himalaya for shade and fodder.

		lbs.
H 36.	Julung, Simla, 5,000 feet	47

3. C. tetrandra, Roxb. Fl. Ind. ii. 63; Brandis 429; Kurz ii. 472; Gamble 72. *C. serotina*, Planch.; Beddome ccxviii. Vern. *Kúmsúm, sungsúm*, Lepcha; *Haktapatia*, Ass.

A tall tree. Wood greyish white, moderately hard. Pores numerous, frequently subdivided, those of the inner edge of each annual ring large, forming a narrow, porous belt; those of the outer portion moderate-sized and arranged in oblique wavy lines. Medullary rays moderately broad and fine, prominent on a radial section as long, narrow plates.

Outer Himalaya, from Kumaun eastwards, Western Ghâts.

Growth moderate, 5 to 10 rings per inch of radius. Weight, 36 to 37 lbs. per cubic foot. Used in Assam for planking and canoes.

		lbs.
E 669.	Bamunpokri Forest, Darjeeling Terai	36
E 707.	Great Rangít Valley, Darjeeling	37

4. C. caucasica, Willd.; Brandis 429. Vern. *Batker*, Pb.

A moderate-sized tree, with grey bark ¼ inch thick. Wood light yellow, hard to very hard. Structure resembling that of *C. australis*, but the pores on the inner edge of each annual ring are very large, and consequently very prominent on a vertical section. Medullary rays broader and further apart than in *C. australis*.

Afghanistan, Beluchistan, Salt Range, Hazara, Kashmir.

Growth moderate, 10 rings per inch of radius. Weight, 44 lbs. per cubic foot.

		lbs.
H 932,	Hazara	44
H 3169.	Dungagalli, Hazara	...

13. SPONIA, Comm.

Wood light-coloured, no heartwood, soft or moderately hard. Pores small or moderate-sized. Medullary rays fine and moderately broad.

1. S. orientalis, Planchon; Beddome ccxix.; Brandis 430; Gamble 72. *Celtis orientalis*, Linn.; Roxb. Fl. Ind. ii. 65. *Trema orientalis*, Bl.; Kurz ii. 468. *S. Wightii*, Planch.; Beddome t. 311, and *S. amboinensis*, Dcne (*S. velutina*, Planch.), are probably not specifically distinct. Indian Nettle Tree. Vern. *Badu manu*, C.P.; *Kooail*, Nep.; *Tugla*, Lepcha; *Param*, Mechi; *Jupong, phakram, jigini, sapong, sempak, amphak, opang* (see Agri-Horticultural Society of India Proceedings for November 1877), Ass.; *Mini*, Tam.; *Gada-nelli*, Tel.; *Gorklu*, Kan.; *Gol*, Mar.; *Rukni*, Baigas.

A small fast-growing and short-lived tree. Bark thin, greyish brown, with numerous lenticels. Wood light reddish grey, soft. Pores moderate-sized, often subdivided, uniformly distributed. Medullary rays fine, numerous, uniform, very prominent on a radial section, the distance between the rays generally equal to or greater than the transverse diameter of the pores.

Himalaya from Nepal eastwards, Bengal, Burma, Central and Southern India.

Growth extremely fast The tree from which our specimen was cut, and which was growing in front of the Sivoke Forest House, had attained in five years a height of 25

r inch of radius
is good for gun-
rafters of native
Amphak cloth
and Coorg coffee
he same has been
aste places, often
in great profusion, and may be much utilized in plantations to help to keep down the grass jungle

		lbs
E 2446	Sivoke, Darjeeling Terai	28

2 S. politoria, Planch , Brandis 430 , Gamble 72 Vern. *Bantamman, kanglu, khúri*, Pb , *Jáun, khasaroa, márui, bátu, banharira*, Hind.; *Khaoi, khákši, kooail*, Nep., *Tuksat*, Lepcha

A small evergreen tree Bark smooth, or with longitudinal wrinkles, inner bark red. Wood white, moderately hard, splits and cracks in seasoning Annual rings marked by a belt of firmer tissue on the outer edge of each ring Pores small, often subdivided, uniformly distributed. Medullary rays fine and moderately broad

Salt Range, Outer Himalaya, Oudh, Sikkim.

Growth very fast, 2 rings per inch of radius Weight, 36 lbs per cubic foot Wood and bark used in a similar way to those of *S orientalis* The leaves are used to polish wood and horn

		lbs
O 1369	Gonda, Oudh	36

Order XCIII PLATANEÆ.

1 PLATANUS, Tourn

P occidentalis, Linn ,
and Brandis by less deeply
slightly smaller fruit-head
cubic foot

1. P. orientalis, Linn ; Brandis 434 Vern. *Chinár*, Pers , Afgh.; *Búin, buna, boin*, Kashmir

A inch thick, smooth, light or dark grey, Wood white, hard, with a faint tinge ngs marked by a band of firm texture with few pores on the outer edge of each ring Pores very small, uniform, and uniformly distributed except in the outer band of the autumn wood. Medullary rays broad, equidistant, shewing on a radial section as glossy, irregular, wavy, shining plates

1 in × 1 in gave an average weight of 38 8 lbs , P = 587. Mathieu gives 41 to

49lbs. It is used in Kashmir for boxes, trays, pen-cases and other articles, which are lacquered and painted. It has a pretty grain and may be recommended for cabinet-work.

	lbs.
H 922. Hazara	41

Order XCIV. CASUARINACEÆ.

One genus, containing chiefly Australian trees, one species only extending northwards to India. Several other species, however, have been introduced and grown in India.

1. CASUARINA, Linn.

1. C. equisetifolia, Forster; Beddome ccxxvi.; Brandis 435; Kurz ii. 494. *C. muricata,* Roxb. Fl. Ind. iii. 519. The Beefwood of Australia. Vern. *Chouk,* Tam.; *Serva,* Tel.; *Kásrike,* Mysore; *Tinyu,* Burm.; *Aru,* Malay.

A large evergreen tree, with leafless drooping branches, and branchlets which are deciduous and perform the functions of leaves. Wood white, brown near the centre, very hard, cracks and splits. Pores moderate-sized, in radial and oblique lines. Medullary rays very fine, uniform, equidistant. Numerous wavy, concentric lines, composed of soft tissue and minute pores.

Coasts of Chittagong, Burma, the Malay Archipelago, North Australia and Queensland. Cultivated all over India, except in the North-Western portion of the Punjab.

The growth is fast, our specimen shews 3 to 4 rings per inch of radius. From Colonel Beddome's Report on the plantations in the North Arcot District, dated December 30th, 1876, the measurements of trees in two plantations were—

	Age.	Height.	Girth.
Veeringapuram plantation . .	4 years	32 feet	24 inches at 3 feet.
Trivellam " . .	6 "	70-80 "	36-48 " "

which would shew an average growth of 1 ring per inch of radius, or a girth of 6 feet at 22 years of age.

The wood is hard and heavy, and difficult to cut, and according to Skinner, No. 42 weighs 55 lbs. per cubic foot; our specimen gives 62 lbs. M. Sebert in 'Notice sur les Bois de la Nouvelle Caledonie' gives 63 lbs. Skinner gives P = 920. It has been largely planted in North Arcot, South Arcot, Madras and other districts of the Madras Presidency for fuel, for which it is excellent, but it requires to be near the sea-coast and to have water at the roots, at least 10 feet from the surface of the ground. Trees planted in sandy soil often suffer much from drought the first two or three years, the taproot then finds its way down to about 10 feet and reaching water the tree begins to thrive. It is of course best near the sea, but fine trees may be seen in places in Northern India, especially at Saharanpur and Umballa. Casuarina seems to coppice well, and undoubtedly is, in suitable localities, and considering its extremely quick growth and the qualities of its wood, one of the most important trees we have for fuel and other plantations.

	lbs.
E 2465. Calcutta	62

Order XCV. EUPHORBIACEÆ.

We shall here follow the nomenclature used in Müller's and Boissier's Monographs of this large Order in the Prodromus of DeCandolle, but adding as Sub-Orders the two separate Orders described in Vol. XVI, *viz., Daphniphyllaceæ* and *Buxaceæ.*

The Order then contains 57 genera belonging to 9 tribes. It contains many important species, though with the exception of *Bischoffia* and *Briedelia* and, of

course, Boxwood, few are specially remarkable for their timber Oils are given by
Phyl-
while

SUB ORDER I EUPHORBIACEÆ

Tribe I —Phyllantheæ . . . *Actephila, Andrachne, Sauropus, Antidesma, Phyllanthus, Melanthesopsis, Breynia, Putranjiva, Securinega, Baccaurea, Aporosa, Hymenocardia, Bischoffia, Cyclostemon, Hemicyclia*

„ II —Bridelieæ *Bridelia, Cleistanthus, Lebedieropsis*

„ III —Crotoneæ *Croton*

„ IV —Acalypheæ . *Macaranga Ricinus Homonoya*

„ V —Hippomaneæ *Bennettia, Microdesmis Manihot, Jatropha, Trigonostemon Givotia, Ostodes, Codiæum, Chætocarpus, Mischodon, Baliospermum, Gelonium, Excæcaria*

„ VI —Dalechampieæ . *Dalechampia*

„ VII —Euphorbieæ *Pedilanthus, Euphorbia*

SUB ORDER II DAPHNIPHYLLACEÆ.

Tribe VIII —Daphniphylleæ *Daphniphyllum.*

SUB ORDER III BUXACEÆ

Tribe IX —Buxeæ *Buxus, Sarcococca*

Actephila contains 4 or 5 large shrubs or small trees *A excelsa*, Dalz, Beddome clxxxix, is a small tree of the Western Ghats *A Thomsoni*, Mull Arg, Beddome cxc, is a shrub of Mysore and the Carnatic *A Javanica*, Miq, and *A puberula*, Kurz ii 340 1, are shrubs of the Andaman Islands *Sauropus* contains ... Kurz ii 349 Gamble 69

Arg ,
of the
456 ,
and ,
tree
hard,
arm ,
forests
xcix ,
, Beddome
C eglan-
dd , of the
an bokul,
ngal and
H elata,
e Western
tree of Burma, ... *H. anda-*
manica, W. and A , is a tree of

rz ii 377 (*A. triloba*, Forst ,
e introduced from the Malay
in many parts of South India.

It is called the 'Belgaum Walnut,' and is so called from the nuts resembling the walnut in flavour. These nuts contain about 50 per cent of oil, which is extracted and used for food and for burning. In M. Sebert's 'Notice sur les bois de la Nouvelle Calédonie,' the wood is said to be white, soft, light and of bad quality, and to have a mean weight of 38 lbs. per cubic foot. *A. cordata*, Müll. Arg., is found in Nepal. *Agrostistachys indica*, Dalz.; Beddome ccv. (*A. longifolia*, Kurz ii. 377) is a small evergreen tree of the Western Gháts, Ceylon, Burma and the Andamans. *Sarcoclinium longifolium*, Wight; Beddome ccv., is a small tree of the Nilgiri Hills and Ceylon, from 4,000 to 6,000 feet. *Sumbavia macrophylla*, Müll. Arg, Kurz ii. 376, is an evergreen tree of the tropical forests of Burma. Of *Cœlodiscus*, Kurz describes 5 new species from Burma, all shrubs. *Cœlodepas calycinum*, Beddome ccvii. t. 320. Vern. *Kátpira*, is a small hard-wooded tree of the Tinnevelly Hills. *Cephalocroton* contains 2 species: *C. leucocephalus*, Baill.; Beddome ccvi., of the Nilgiris; and *C. indicus*, Beddome t. 261, a moderate-sized tree of the Western Gháts, said to give a good building timber. Of *Symphyllia* 2 species are found: *S. mallotiformis*, Müll. Arg.; Beddome ccvii., in the Nilgiris; and *S. silhetana*, Baill.; Kurz ii. 378, in the Khasia Hills, Eastern Bengal and Tenasserim. *Claoxylon* contains 3 and *Acalypha* 1 (*A. fruticosa*, Forsk.) shrub of the forests of Burma. *Tragia* contains 2 and *Cnesmone* 1 (*C. javanica*, Bl.) climbing shrubs of Burma. *Alchornea* contains 3 shrubs: *A. mollis*, Müll. Arg., of Nepal; *A. rugosa*, Müll. Arg., of Tenasserim and the Andamans, and *A. tiliæfolia*, Müll. Arg.; Kurz ii. 386; Gamble 71, of Sikkim, the Khasia Hills, Sylhet, Tenasserim and the Andamans. *Cleidion Javanicum*, Bl.; Beddome t. 272; Kurz ii. 390; Gamble 70, is a tree of Northern and Eastern Bengal, South India and Burma.

Bennettia Wallichii, R. Br. (*Galearia Wallichii*, Kurz ii. 407) and *Microdesmis casceariæfolia*, Planch.; Kurz ii. 408, are small trees of the forests of Tenasserim. *Manihot utilissima*, Pohl.; Kurz ii. 408. Vern. *Pulu pinan myouk*, Burm., is a shrub of tropical America, introduced and cultivated in Burma. It yields 'the manioc', or 'cassava' meal and 'tapioca.' *Trigonostemon* contains about 6 species, the chief of which is *T. Lawianus*, Nimmo; Beddome t. 273, a small tree of the Western Gháts and Ceylon. *Codiæum* contains 4 species: *C. umbellatum*, Müll. Arg.; Beddome ccxiii. of the Western Gháts, one species in Burma and two in the Andaman Islands. This genus gives the ornamental variegated-leaved plants called 'Crotons,' now so much cultivated in Indian gardens. *Mischodon zeylanicus*, Thw.; Beddome t. 290. Vern. *Tamana*, Cingh., is a handsome large tree of Ceylon, with good timber; it has been found by Beddome in Tinnevelly. *Baliospermum* contains 3 undershrubs of Northern and Eastern Bengal, the commonest of which, *B. montanum*, Müll. Arg. (*Croton polyandrum*, Roxb. Fl. Ind. iii. 682; Gamble 70). Vern. *Hakún*, Hind.; *Konda-amadum*, Tel; *Poguntig*, Lepcha, extends to South India and Burma.

Dalechampia scandens, Linn.; Kurz ii. 400, is a climbing shrub of Burma, *Pedilanthus tithymaloides*, Poir.; Kurz ii. 418, is a short rather fleshy shrub often cultivated in Burma. *Daphniphyllum glaucescens*, Bl.; Beddome ccxvii. t. 288. Vern. *Nir-chappay*, Burghers, is a handsome tree of the Western Gháts; and *D. himalayense*, Müll. Arg. Vern. *Raktchandan, rakt anglia*, Kumaun, is a tree of the Himalaya from Kumaun eastwards and the Khasia Hills found above 5,000 feet altitude.

Several exotic trees belonging to this family have been introduced, and an attempt made at their cultivation in India *Hevea braziliensis*, Müll. Arg.; and other species of *Hevea* give the Brazilian caoutchouc. That named is the Para rubber, and is now being grown for distribution in the Botanic Gardens, Calcutta, from plants received in 1877. The 'Ceara' caoutchouc, a species of *Manihot*, probably *M. Glaziovii*, is also being grown The very interesting account of their collection by Mr. Cross may be found at vol. iv, No. 1, p. 5 of the 'Indian Forester' for 1878, and an account of their state on arrival in India in Dr. King's annual report of the Botanic Gardens at Calcutta for the year 1877-78.

The great majority of the woody Euphorbiaceæ the wood of which is here described, belonging to the following genera—*Antidesma, Baccaurea, Bischoffia, Cleistanthus, Excæcaria, Homonoya, Jatropha, Lebidieropsis, Macaranga, Mallotus, Ostodes, Putranjiva, Trewia*—may, as regards the structure of their wood, be said to belong to one type, which is characterised as follows:

Very fine, or extremely fine, and closely packed medullary rays Pores small or very small, often in radial lines

The genera *Phyllanthus* and *Briedelia* differ by having their medullary rays broader and further apart

The genera *Securinega, Andrachne, Buxus* and *Sarcococca* have very small or extremely small pores, and fine to extremely fine medullary rays

Croton and *Chætocarpus* have extremely fine and closely packed medullary rays, but the wood is marked by wavy concentric lines, which are wanting in other genera of Euphorbiaceæ

Givotia has scanty pores and short distant medullary rays

Of these genera only *Lebidieropsis* and *Bischoffia* have a distinct heartwood, some of the others have darker coloured wood near the centre

1 ANDRACHNE, Linn

Two shrubs *A telephioides*, Linn, Brandis 457 is a small undershrub of the Punjab Salt Range

1 A cordifolia, Mull Arg, Brandis 456 Vern *Kurkni, gurguli*, Jhelum, *Bersu*, Chenab, *Banotri, madare*, Ravi, *Mutkar, chirmutti, pin* Beas, *Tsatin*, Sutlej

A small shrub Wood white, moderately hard close grained Pores very small and extremely small, larger and more numerous in the inner belt of the annual rings Medullary rays extremely fine, very numerous

North West Himalaya from the Indus to Nepal ascending to 8 000 feet Weight 45 lbs

		lbs
H 2945	Jander Sutlej Valley 3 500 feet	45

2 ANTIDESMA, Burm

About 14 species *A refractum* Mull Arg is a small tree of Sikkim at about 2 000 feet *A nigricans* Tul and *A simile* Mull Arg are small trees of Sylhet and

Wood hard, smooth, apt to split and warp Pores small, numerous Medullary rays of two classes, very fine, and moderately broad

1 A Ghæsembilla, Gaertn, Beddome cc, Brandis 446, Kurz ii 358 *A pubescens*, Willd, and *A paniculatum*, Roxb II Ind iii 769, 770 Vern *Khudi jamb, limtoa*, Beng, *Urtoa* Hazaribagh, *Pulsur, polari, jana pa laseru, pollai*, Tel, *Jondri*, Mar, *Byaitsin*, Burm, *Boo ambilla*, Cingh

A small deciduous tree with grey or pale brown bark, $\frac{1}{8}$ inch thick, with a few deciduous scales Wood red, with darker coloured heartwood smooth, hard, close and even grained Annual rings indistinctly marked by concentric lines Pores small and moderate sized, uniformly distributed Medullary rays of two sizes, few moderately broad rays with numerous fine rays between them, prominent on a radial section

Nepal Oudh Bengal Burma Chanda district and South India Weight 49 lbs per cubic foot The leaves are eaten in Bengal

		lbs.
C 1161.	Ahiri Reserve, Central Provinces	46
B 2246.	Andaman Islands (1866)	52

2. E 2430 (46 lbs.) from the Chenga Forest, Darjeeling, has a similar structure. It is marked *A. Bunias*, Spr.; Beddome cc.; Kurz. ii. 358; Gamble 69. Vern. *Himalcheri*, Nep.; *Kantjer*, Lepcha. A small tree of Northern and Eastern Bengal, South India and Tenasserim.

3. **A. Menasu**, Müll. Arg.; Kurz ii. 360; Gamble 69. Vern. *Kumbyúng*, *tungcher*, Lepcha; *Kin-pa-lin*, Burm.

A small tree. Bark thin. Wood red, structure similar to that of *A. Ghæsembilla*, but the pores smaller and the medullary rays finer.

Sikkim, Khasia Hills, Burma and the Andaman Islands.
Weight, 52 lbs. per cubic foot. Fruit eaten.

		lbs.
E 2431.	Chenga Forest, Darjeeling	52

4. **A. diandrum**, Tulasne; Beddome cci.; Brandis 447; Kurz ii. 360; Gamble 69. *Stilago diandra*, Roxb. Fl. Ind. iii. 759. Vern. *Amli*, *amári*, *sarshoti*, *gúr mussureya*, *ban mussureya*, *dhakki*, Hind.; *Mutta*, Beng.; *Patimil*, Nep.; *Kantjer*, Lepcha; *Nuniári*, Uriya; *Pella-gumudu*, Tel.; *Masúr bauri*, Gondi; *Kin-pa-lin*, Burm.

A small tree with smooth grey bark; inner bark pale red, fibrous. Wood pinkish grey, hard, close-grained. Pores small and very small, uniformly distributed. Medullary rays of two sizes, moderately broad and very fine, wavy. Annual rings marked by a fine line.

Garhwal, Kumaun, Oudh, Bengal, South India and Burma.
Weight, 41 lbs. per cubic foot. The leaves are acid and are eaten; they resemble sorrel and are made into chutni. The fruit is eaten.

		lbs.
O 1368.	Gonda, Oudh	42
O 1464.	Bahraich, Oudh	40

3. PHYLLANTHUS, Linn.

A large genus formed by the grouping together of several genera or sections, such as *Glochidion*, *Phyllanthus*, *Emblica*, etc. It contains 43 Indian species of trees or shrubs, which are thus arranged by Müller:—

SECTION I. EUGLOCHIDION.

P. multilocularis, Müll. Arg.	Bengal, Burma.
(*P. calocarpus*, Kurz)	Andamans.
P. coccineus, Müll. Arg.	Bengal, Burma.
P. zeylanicus, Müll. Arg.	South India, Andamans.
(*P. andamanicus*, Kurz)	Andamans.
P. nitidus, Müll. Arg.	South India.
P. lanceolarius, Müll. Arg.	North India, Bengal, Burma.
P. tomentosus, Müll. Arg.	South India.
P. canaranus, Müll. Arg.	Ditto.
P. Helferi, Müll. Arg.	Burma, Andamans.
P. subscandens, Müll. Arg.	Burma.

SECTION II. HEMIGLOCHIDION.

P. Hohenackeri, Müll. Arg.	South India.
P. fagifolius, Müll. Arg.	Bengal, Burma, South India.
P. nepalensis, Müll. Arg.	North India, Bengal.

P Thomsoni Mull Arg	Bengal
P sphærogynus Mull Arg	Burma
P asperus Mull Arg	South India
P sylheticus Mull Arg	Bengal
P assamicus Mull Arg	Ditto
P glaucifolius Mull Arg	Burma
P neilgherrensis Mull Arg	South India
P arboreus Mull Arg	Ditto
P stellatus Retz	Bengal
P malabaricus Mull Arg	South India
P Perrottetian s Mull Arg	Ditto
P velutinus Mull Arg	Bengal South India
P Daltoni Mull Arg	Bengal Burma South India
P Heyneanus Mull Arg	South India
P bicolor Mull Arg	Bengal
P khasicus Mull Arg	Ditto
(*P dasystylus* Kurz)	Burma
(*P leiostylus* Kurz)	Ditto

SECTION III KIRGANELIA

P reticulatus Mull Arg	All India and Burma

SECTION IV EMBLICA

P Emblica Linn	All India and Burma
P polyphyllus Willd	South India
P bæobotryoides Mull Arg	Bengal Burma
P columnaris Mull Arg	Burma

SECTION V PARAPHYLLANTHUS

P juniperinoides Mull Arg	South India

SECTION VI CICCA

P distichus Mull Arg	India Burma Andamans
P cyanospermus Mull Arg	South India
P indicus Mull Arg	Ditto
(*P albizzioides* Kurz)	Burma
(*P macrocarpus* Kurz)	Ditto

Thus it will be seen that 4 species are found in North West India 16 in Northern and Eastern Bengal 21 in South India 18 in Burma and 5 in the Andaman Islands Few of them are of much importance *P lanceolarius* Mull Arg Brandis 453, Gamble 68 (*Glochidion lanceolarium* Dalz Beddome exca Kurz 313 *Bradleia*

[illegible]

Wood red, splits and warps No heartwood Pores moderate sized, subdivided Medullary rays moderately broad, distant, prominent on a vertical section, giving the wood a mottled appearance

1 P. Emblica, Linn , Roxb Fl Ind iii 671, Beddome t 258

Brandis 454; Gamble 68. *Cicca Emblica*, Kurz ii. 352. Vern. *Ambal*, *ambli*, Pb.; *Daula*, *amla*, *amlika*, *aura*, *aola*, *aunra*, Hind.; *Aunla*, Nep.; *Suom*, Lepcha; *Amla*, *ambolati*, *amulati*, Beng.; *Ambari*, Gáro; *Amluki*, Ass.; *Alá thanda*, Cuttack; *Nilli*, *milli*, *nalli*, *avnri*, *usir*, *lalla*, Gondi; *Aunre*, Kurku; *Nelli*, *nellekai*, Tam.; *Osirka*, *usri*, *asereki*, Tel.; *Nelli*, *nilika*, Kan.; *Ohalu*, *gondhona*, Uriya; *Aonli*, Mar.; *Nelli*, Cingh.; *Shabju*, *tasha*, Burm.

A moderate-sized deciduous tree. Bark somewhat less than $\frac{1}{3}$ inch thick, grey, exfoliating in small irregular patches, inner substance red. Wood red, hard, close-grained, warps and splits in seasoning. No heart-wood, annual rings not distinct. Pores small and moderate-sized, uniformly distributed, often subdivided or in short radial lines. Medullary rays moderately broad and broad, the distance between two rays generally greater than the transverse diameter of the pores. Medullary rays very prominent on a radial section, giving the wood a handsome mottled appearance.

Dry forests of India and Burma.

The annual rings are not sufficiently distinct in our specimens for counting. Aikin in Wallich's list gives 2·7 rings per inch of radius.

The weight and transverse strength have been determined by the following experiments:—

Experiment by whom made.	Year.	Wood whence procured.	Weight.	No. of experi-ments.	Size of bar used.	Value of P.
					Ft. in. in.	
Puckle	1859	Mysore	67	2	2 × 1 × 1	975 (?)
Kyd	1831	Assam	45	...	......	617
Skinner, No. 105 . . .	1862	South India . .	46	...	......	562
Cunningham . . .	1854	Gwalior . . .	46	2	2 × 1 × 1	559
R. Thompson . . .	1868	Central Provinces	45	...	......	...
A. Mendis	1855	Ceylon	49	...	......	...
Brandis (No. 98) . .	1862	Burma	35	...	......	...
Warth	1878	Different Provs.	51	8	......	...

The wood is durable under water, and is used for well-work; also for agricultural implements, building and furniture.

The bark is used for tanning and in medicine; chips of the wood are said to clear muddy water. The fruit is the Emblic Myrobolam, and is used as a medicine, for dyeing, tanning, and for food and preserves. It gives a gum, which is not used.

			lbs.
P	104.	Bhajji, Simla, 3,000 feet	56
P	438.	Ajmere	...
O	252.	Garhwal (1868)	49
O	539.	Dehra Dún	48
E	580.	Khookloong Forest, Darjeeling Terai	56
E	2432.	Bamunpokri, Darjeeling Terai	48
C	1126.	Ahiri Reserve, Central Provinces	51
C	2738.	Moharli Reserve, Central Provinces	56
C	841.	Bairagarh Reserve, Berar	45
C	2774.	Melghát, Berar	...
No.	61.	Ceylon Collection	56

2. **P. Thomsoni**, Müll. Arg.; Gamble 68. Vern. *Latikat*, Nep.

A small tree. Wood red, structure the same as that of *P. Emblica*.

Sikkim and the Khasia Hills
Weight 42 lbs per cubic foot

		lbs
E 2431	Bamunpokri Darjeeling Terai	42

3 **P bicolor,** Mull Arg , Brandis 453 , Gamble 68 Vern *Lali-kat, lakrikat,* Nep , *Kaur, tetrikau,* Lepcha

An evergreen tree, with thin grey bark Wood red or reddish grey, hard Pores small and moderate sized uniformly distributed Medullary rays fine and moderately broad, numerous, very prominent on a radial section, giving the wood a mottled appearance

Nepal Sikkim and Khasia Hills ascending to 7 000 feet
Growth moderate 8 rings per inch of radius
Weight 37 to 47 lbs per cubic foot

		lbs
E 685	Sepoydura forest, Darjeeling 5 500 feet	37
E 2433	Takdah Forest Darjeeling 6,000 feet	47

4 **P. reticulatus,** Poiret, Beddome exc , Brandis 453 , Gamble 68 *P multiflorus,* Roxb Fl Ind iii 664 *Cicca reticulata,* Kurz ii 354 Vern *Pangule, makhi,* Hind , *Nella purududu, phulsai,* Tel , *Welkyla,* Cingh

A straggling shrub Bark brown, thin Wood white or greyish white, hard, close grained Pores small, scanty more numerous in the spring wood, marking thus the annual rings Medullary rays fine, numerous, wavy

Common in most parts of India and Burma especially along river banks

E 3362 Dhupgur W Duars

4 PUTRANJIVA, Wall

1. **P Roxburghii,** Wall , Beddome t 275 , Brandis 451 , Kurz ii 366 *Nageia Putranjiva,* Roxb Fl Ind iii 766 Vern *Putajan,* Pb , *Jia puta, joti, juti, putra jiva, patji jivputrak, patigia,* Hind , *Karupale,* Tam , *Kadrajivi,* Tel , *Pongilam,* Mal , *Jewan putr,* Mar , *Toukyap,* Burm

A moderate sized evergreen tree with pendent branches Bark dark grey Wood grey, shining, moderately hard, close grained Annual rings marked by prominent concentric lines Pores small to moderate-sized, in radial lines, between closely packed, uniform, fine, medullary rays Very numerous, very fine transverse bars

Sub Himalayan tract from the Chenab eastwards Oudh Bengal Burma and South India
[illegible]
[illegible]

		lbs
O 1459	Bahraich Oudh	48
O 1177	Gonda Oudh	49
E 5169	Calcutta	8

5. SECURINEGA, Juss.

Three species. *S. grisea*, Müll. Arg., is a shrub of the Khasia Hills.

1. S. obovata, Müll. Arg.; Beddome cxcvii.; Brandis 455; Gamble 68. *Phyllanthus retusus* and *virosus*, Roxb. Fl. Ind. iii. 657, 659. *Cicca obovata*, Kurz ii. 354. Vern. *Dalme, dhàni, bakarcha, ghari, gwala, darim*, Hind.; *Iktibi*, Lepcha; *Ukieng, thaka*, Mechi; *Kodarsi*, Mar.; *Korchi*, Gondi; *Yae-chinya*, Burm.

A small tree. Bark rusty or reddish brown. Wood reddish yellow, close-grained. Annual rings marked by a white line. Pores small, numerous, uniformly distributed. Medullary rays fine, the distance between the rays greater than the transverse diameter of the pores.

Suliman Range, Sub-Himalayan tract and Outer Himalaya ascending to 5,000 feet, Eastern Bengal, Central and South India and Burma.

Growth slow, 14 to 16 rings per inch of radius. Weight, 52 lbs. per cubic foot. Wood durable, used for agricultural implements. Bark astringent, used to intoxicate fish.

		lbs.
H 2941.	Jander, Sutlej Valley, 3,000 feet	52
P. 3247.	Ajmere	...

2. S. Leucopyrus, Müll. Arg.; Beddome cxcvii.; Brandis 456; Gamble 68. *Phyllanthus Leucopyrus*, Roxb. Fl. Ind. iii. 658. *Cicca Leucopyrus*, Kurz ii. 353. Vern. *Pera pastawane*, Afg.; *Kakún, rithei, girthan, gargas, bháthi, bata, vanúthi, girk*, Pb.; *Hartho, aintha*, North-Western Provinces; *Kiran*, Sind; *Challa manta, sále manta*, Central Provinces; *Achal*, Nep.

A large shrub or small tree. Bark smooth, reddish brown, with few vertical cracks. Wood pink, hard, close-grained. Pores small, often subdivided or in short radial lines, numerous, uniformly distributed. Medullary rays very fine and fine, numerous, bent where they touch the pores.

Outer Himalaya, ascending to 5,000 feet, throughout India and Burma.

Wood only used as fuel.

E 3319. Pankabari, Darjeeling, 2,000 feet.
E 3282. Sitapahar Reserve, Chittagong.

6. BACCAUREA, Lour.

Müller describes 6 species: *B. affinis*, Müll. Arg. and *B. parviflora*, Müll. Arg.; Kurz ii. 357, from South Tenasserim; *B. propinqua*, Müll. Arg., from Sylhet; *B. courtallensis*, Müll. Arg., and *B. flaccida*, Müll. Arg., from South India.

1. B. sapida, Müll. Arg.; Beddome t. 280; Kurz ii. 356; Gamble 69. *Pierardia sapida*, Roxb. Fl. Ind. ii. 254. Vern. *Lutco*, Hind.; *Kala bogoti*, Nep.; *Sumbling*, Lepcha; *Latecku*, Ass.; *Koli kuki*, Kan.; *Kanaizu*, Magh; *Kanazo*, Burm.

A moderate-sized evergreen tree, with thin grey corky bark. Wood greyish brown, soft, liable to split badly. Pores small, in short radial lines. Medullary rays moderately broad to broad, the distance between the rays being from one to three times the transverse diameter of the pores. Wood cells very large, arranged in transverse lines which have the appearance of innumerable short fine bars across the rays.

Bengal, Assam, Burma, and Andaman Islands.

Weight, according to Brandis' Burma List of 1862, No 97, 61 lbs, Wallich, No 154, 38 lbs; our specimens average 42 lbs The wood is not used The fruit is much eaten, it is acid and pleasant, and is called '*Lutqua*' The leaves are used in Northern Bengal and Assam for dyeing

		lbs
E 1265	Tezpur, Assam	42
B 2552	Burma (1862)	44
B 3145	♂ Magayee, Burma	42
B 3146	♀ " "	43
B 2686	Tavoy (Wallich, 1828)	41
B 2720.	" "	41

7. APOROSA, Bl.

Contains eight species *A. villosa*, Baill, Kurz ii 361 Vern *Ye mein*, Burm, is a tree of Burma whose bark is used for dyeing red, and which gives a red resin *A.* [illegible]

tree of Northern and Eastern Bengal and Burma

This last has been identified with the tree producing the 'Coco wood' of commerce, generally supposed to come from the West Indies

No 2925 is the Coco wood It has a dark brown, very hard, close grained wood, with white sapwood, and resembles that of *Homonoya* (see page 364) in structure It weighs 79 lbs per cubic foot

The wood of *Aporosa dioica* should be carefully examined to prove that the Indian tree gives a timber similar to Coco-wood.

8. BISCHOFFIA, Bl.

1. B. javanica, Bl, Beddome t 259, Brandis 446; Kurz ii 355; Gamble 69. *Andrachne trifoliata*, Roxb. Fl Ind. iii 728. Vern. *Kein, koisa, irum*, Hind.; *Kainjal*, Nep.; *Sinong*, Lepcha; *Taisok, urúm*, Mechi; *Uriam*, Ass; *Bolzuru*, Gáro; *Joki*, Cachar; *Boke*, Bombay; *Thondi*, Tam.; *Goi arnellu*, Hassan, *Modagerri iembu*, Tinnevelly.

A deciduous tree. Bark rough, dark grey with a brown tinge, exfoliating in angular scales Wood red, rough, moderately hard, with a small darker-coloured heartwood Pores moderate sized, in short radial lines. Medullary rays moderately broad and very fine, the distance between the broad rays being from one to three times the transverse diameter of the pores.

Kumaun, Garhwal, Oudh, Gorakhpur, Bengal, South India and Burma.

[illegible] Weight, [illegible] foot. [illegible] 99 of [illegible] esteemed [illegible] Beddome [illegible] lled 'Red Cedar.'

		lbs.
O 1374.	Gonda, Oudh	44
E 654.	Bamunpokri, Darjeeling Terai	53
E 1257.	Tezpur, Assam	47
E 2191.	Nowgong, Assam	46
E 2467.	Calcutta (sapwood)	36

9. BRIEDELIA, Willd.

About 7 species. *B. ovata*, Dene; Kurz ii. 368, is a small tree of Tenasserim and the Andamans. *B. Hamiltoniana*, Müll. Arg., is a small tree with two varieties, one found in Behar, the other on the Bombay Ghâts. *B. stipularis*, Bl.; Beddome cci.; Brandis 449; Kurz ii. 369; Gamble 69 (*B. scandens*, Roxb. Fl. Ind. iii. 736) Vern. *Madlatáh, 'undergúpa*, Oudh; *Lilima*, Nep.; *Dúnkibúra*, Tel.; *Kihur, kohi*, Ass.; *Harinhara*, Beng; *Sin-ma-no-pyin*, Burm., is a large climbing shrub of most parts of India and Burma, with a dark heartwood; it is used for fuel in the Sundarbans. *B. dasycalyx*, Kurz ii. 369, is a climber of the forests of Burma.

Heartwood grey or olive brown, seasons well. Pores small to moderate-sized. Medullary rays fine or moderately broad.

1. B. retusa, Sprengel; Beddome t. 260; Brandis 449; Kurz ii. 368; Gamble 69. *B. crenulata*, Roxb., and *B. spinosa*, Willd.; Roxb. Fl. Ind. iii. 734, 735. Vern. *Pathor, mark*, Pb., *Khaja, kassi, gauli*, Hind.; *Lamkana*, Ajmere; *Angnera*, Banswara; *Asana*, Mar.; *Geio*, Nep.; *Pengji*, Lepcha; *Nanda*, Rajbanshi; *Katakuchi*, Mechi; *Kashi*, Gáro; *Kamkúi*, Chittagong; *Kosi*, Uriya; *Mulu-vengay, kamanji*, Tam.; *Koramau, dudi máddi, koramadi, duriamadi*, Tel.; *Kassei*, Gondi; *Karka*, Kurku; *Gúnjan, kati ain*, Mar., Bhíl; *Asuna, gojé*, Kan.; *Adamarathu*, Tinnevelly; *Tseichyee*, Burm., *Katta kaala*, Cingh.

A large deciduous tree, with thorns on the bark of young stems. Bark ¼ inch thick, grey or brown, rough with longitudinal cracks and exfoliating in long irregular plates. Sapwood small; heartwood grey to olive brown, close-grained, seasons well, moderately hard, the annual rings marked by concentric lines. Pores uniformly distributed, moderate-sized, often in short radial lines. Medullary rays numerous, uniform and equidistant, moderately broad, visible on a radial section as rough, narrow plates; the distance between two rays equal to, or less than, the transverse diameter of the pores. This wood has a mottled grain and takes a beautiful polish.

Sub-Himalayan tract, from the Chenab eastwards, ascending to 3,600 feet, Oudh, Bengal, Central and South India, Burma.

Growth fast, our specimens shewed an average of 5-6 rings per inch of radius. Weight, Skinner, No. 291, gives 60 lbs.; R. Thompson, 54 lbs.; Brandis, No. 23, Burma List, 1862, 66 lbs.; the average of our specimens is 50 lbs. according to Dr. Warth's weighings of specimens. Skinner gives P = 892. This is, probably, Kyd's *B. stipularis*, Vern. *Kohi*, Ass., weight 64 lbs., P = 525. Wood durable, used for cattle-yokes, agricultural implements, carts and building. It stands well under water. The bark is used for tanning, the fruit eaten, and the leaves cut to feed cattle.

		lbs.
P 461.	Ajmere	48
O 259.	Garhwal (1868)	45
O 3001.	„ (1874)	43
O 1480.	Kheri, Oudh	61
O 347.	Gorakhpur (1868)	47
C 1174.	Ahiri Reserve, Central Provinces	55

		lbs
C 840	Bairagarh Reserve, Berar	63
C 2765	Melghat Berar	45
E 645	Sepoydura Darjeeling 5 000 feet	53
E 619	Bamunpokri Darjeeling Terai	56
E 2428	, ,	46
B 3074	Burma (1862)	46
B 1431	Tharrawaddy Division Burma	56
No 43	Ceylon Collection .	44
No 68	,	38

2. **B. montana,** Willd , Roxb. Fl Ind iii 735, Beddome cciı , Brandis 450, Gamble 70 Vern *Kargnalia, khaja, geia, kusi,* Hind , *Geio,* Nep , *Kaisho,* Ass , *Patenga,* Tel

A moderate sized deciduous tree Wood grey, beautifully mottled, annual rings distinctly marked by darker and firmer wood on the outside of each ring Pores small and moderate sized, often in radial lines, the transverse diameter of the pores being generally less than the distance between the fine and uniformly distributed medullary rays, which are prominent on a radial section

Sub Himalayan tract from the Jhelam eastwards ascending to 4 000 feet Oudh, Bengal

Growth fast 4 rings per inch of radius Weight 46 to 59 lbs per cubic foot, but the heavier specimen was perhaps not sufficiently seasoned Wood very similar to that of *B retusa* and might be used for the same purposes The leaves are lopped for cattle fodder

		lbs
O 1375	Gonda Oudh	59
C 199	Mandla, Central Provinces (1870)	46

3 **B tomentosa,** Bl , Kurz ii 367, Gamble 70 *B lanceæfolia,* Roxb Fl Ind iii 737 Vern *Sibri,* Nep , *Mantet,* Lepcha , *Sirai, mindri,* Beng

A small evergreen tree Wood light olive brown, hard, close grained Pores small, often subdivided, enclosed in rounded patches of soft tissue, which are generally arranged in oblique, undulating lines, the transverse diameter is greater than the distance between the very fine, very numerous, uniform and equidistant medullary rays

North East Himalaya ascending to 2 000 feet Eastern Bengal and Burma Weight 64 lbs per cubic foot

		lbs
E 1397	Chittagong . . .	64

10 CLEISTANTHUS, Hook f

About 7 species *C patulus* Müll Arg *C malabaricus* Müll Arg and

1. **C myrianthus,** Kurz ii 370 Vern *Mo man tha,* Burm

A moderate sized evergreen tree Wood moderately hard, reddish grey Pores small, numerous, often subdivided Medullary rays fine, very numerous, closely packed

Tropical forests of Burma and the Andaman Islands

		lbs
B 2471	Andamans (Kurz 1866) .	41

11. LEBEDIEROPSIS, Müll. Arg.

1. L. orbicularis, Müll. Arg.; Beddome cciii.; Brandis 450. *Cluytia collina*, Roxb. Fl. Ind. iii. 732. Vern. *Garrar*, *gárári*, Hind.; *Karada*, Uriya; *Korsi*, *wodesha*, *kadishen*, *korshe*, Tel.; *Wodayu*, *waddan*, Tam.; *Garari*, Mar.; *Madara*, Cingh.

A small deciduous tree. Bark ¼ inch thick, dark brown, almost black, often with a reddish tinge, rough with numerous cracks, exfoliating in rectangular woody scales. Wood red, tough, moderately hard to hard, close and even-grained, warps in seasoning. Heartwood dark red, small; sapwood lighter coloured. Pores small, arranged in radial lines between the very fine and very numerous equidistant medullary rays.

Bandelkhand, Satpura Range and forests southwards to the Godavari mountains of South India.

Weight, 54 to 55 lbs. per cubic foot. Beddome says the wood is much used in India. It coppices readily and in great abundance; it may, therefore, be specially recommended where fuel has to be produced in tropical parts of India, but it is also recommended as a useful wood for turning. The outer crust of the capsule is said to be poisonous.

		lbs.
C 1175.	Ahiri Reserve, Central Provinces	54
C 1252.	Gumsúr, Madras	55
C 1306.	„ „	54

This wood resembles that of *Eugenia operculata* in outward appearance and in structure, but differs by the absence of concentric lines. It is almost identical with that of *Flacourtia Ramontchi*, and if it were not for the great difference in the bark which in *Lebedieropsis* is darkcoloured, almost black and deeply fissured, and in *Flacourtia* light coloured, smooth, with short narrow horizontal cracks, one might be inclined to suspect a mistake in the specimens. The only difference that can be seen under the glass is that the medullary rays in *Flacourtia* are slightly wavy, while those of *Lebedieropsis* are straight.

12. CROTON, Linn.

A large genus of trees and shrubs, erect or straggling, with about 19 Indian species. The following list has been extracted from Müller's Monograph in DeCandolle's Prodromus, Vol. xv. 2, those newly added by Beddome and Kurz being given in brackets:—

SECTION I. ELUTERIA.

C. Joufra, Roxb.	Eastern Bengal, Burma.

SECTION II. EUCROTON.

C. argyratus, Bl.	Burma, Andamans.
C. oblongifolius, Roxb.	North and South India, Bengal, Burma.
C. reticulatus, Müll. Arg.	South India.
C. lacciferus, Linn.	Ditto.
C. aromaticus, Linn.	Ditto.
C. chlorocalyx, Müll. Arg.	Eastern Bengal.
C. rhodostachyus, Müll. Arg.	Burma.
C. caudatus, Müll. Arg.	Eastern Bengal, Burma, South India.
C. Tiglium, Linn.	Bengal, Burma, South India.
C. birmanicus, Müll. Arg.	Burma.
C. lævifolius, Bl.	Eastern Bengal.
C. Wallichii, Müll. Arg.	Burma.

(*C scabiosus* Beddome)	South India
(*C malabaricus* Beddome)	Ditto
(*C robustis* Kurz)	Burma
(*C sublyratus* Kurz)	Andamans
(*C flocculosus* Kurz)	Burma
(*C calococcus* Kurz)	Ditto

C Joufra Roxb Fl Ind iii 685 Kurz ii 373 Vern *Joufra* Beng is a tree of Eastern Bengal and Burma *C oblongifolius* Roxb Fl Ind ii 688 Beddome cciv Brand s 439 Kurz ii 373 Gamble 70 Vern *Arjunna* Oudh *Ach* Nep

able medicine

C scabiosus Beddome t 283 and *C malabaricus* Beddome cciv are trees of the Western Ghats with silvery leaves

1 **C argyratus,** Bl , Kurz ii 372 Vern *Chonoo,* Burm , *Talib-da,* And

A moderate sized or small evergreen tree Bark thin grey Wood hard, yellow, close and even grained, seasons well Pores large and very large, scanty, circular, very prominent on a vertical section Medullary rays extremely fine, very numerous Numerous wavy concentric lines (of darker colour?)

Martaban Tenasserim and the Andaman Islands
Weight 46 to 48 lbs per cubic foot Wood worthy of notice

		lbs
B 501	Andaman Islands	48
B 515		46

2 **C caudatus,** Mull Arg Kurz ii 375, Gamble 70 *C drupaceum,* Roxb Fl Ind iii 683 Vern *Nan bhantur,* Beng , *Takchabrik,* Lepcha

A large straggling shrub Bark thin, grey Wood white or yellowish white, hard, close grained Pores large scanty, sometimes subdivided, prominent on a vertical section Medullary rays very fine to extremely fine, very numerous Numerous wavy concentric lines of white tissue often interrupting the rays

Bengal Assam Burma and South India, chiefly on the banks of streams
Home says the wood is used for fuel and the leaves applied as poultices to sprains

E 3298 Sivoke Darjeeling Terai

B 3201 Burma (1862) *Thityinkat* supposed to be *Croton oblongifolius* has a white wood similar in structure to *C argyratus* except that the fine wavy concentric bands are more prominent and the pores are smaller

13 TREWIA, Linn

1 **T nudiflora,** Linn , Roxb Fl Ind iii 837, Beddome t 281, Brandis 443, Kurz ii 379, Gamble 70 Vern *Tumri, Khamara bhil laura,* Hind , *Pitali,* Beng , *Garum, gamari,* Nep , *Tungflam,* Lepcha,

Fine, uniform, closely packed medullary rays, pores small, in radial lines, in some species numerous faint transverse bars

1. M. philippinensis, Mull Arg, Beddome t 289, Brandis 444, Kurz ii 381, Gamble 70 *Rottlera tinctoria,* Roxb Fl Ind iii 827 Vern *Kamela, kamal, kambal, kumila,* Pb, *Ruen, riuna, roli,* Kumaun, *Rohni,* Oudh, *Reoni,* Banda, *Rauni, rori,* C P, *Pûnag, tung, kishur,* Beng, *Sinduria,* Nep, *Puroa, tukla,* Lepcha, *Baraiburi, sindurpong,* Mechi, *Chinderpang, machugan,* Gáro, *Gangai puddum,* Ass, *Kumala, sundragundi,* Uriya, *Kapli, kapila,* Tam, *Kumkuma, vassuntagunda, chendra, sinduri,* Tel, *Koku,* Gondi, *Kuiku, corunga manje, sairiakasari, hulichellu,* Kan, *Shendri,* Mar, *Ponnagam,* Mal., *Hamparandella,* Cingh, *Tau theedin,* Burm

A small tree Bark ¼ inch thick, grey, inner substance red, marked by irregular cracks Wood smooth, grey to light red, hard, close grained, no heartwood Annual rings indistinct Pores small, uniformly distributed, scanty, often subdivided Medullary rays uniform, very fine, very numerous, equidistant, the distance between them less than the diameter of the pores Faint indications of transverse bars

Sub Himalayan tract from the Indus eastwards ascending to 4 500 feet Bengal, Central and South India, Burma and the Andaman Islands

Weight 48 lbs per cubic foot Wood warps and shrinks used only for fuel The bark is used *for tanning* *The crimson powder which covers the ripe fruit is used for* dyeing silk and as a purgative and anthelmintic Dr Bidie states in his Paris Exhibition List of 1878 that he described the structure of the grains of Kamela in the *Madras Quarterly Journal of Medical Science* He says that they consist of a red substance enclosed in a membranous sac, which is not acted on by water, though soluble in alcohol or an alkaline solution

			lbs
P	109	Sutlej Valley, 3 000 feet	50
C	1178	Ahiri Reserve Central Provinces	43
E	599	Bamunpokri Darjeeling Terai	51
E	2421	" " "	49

2 M. albus, Mull Arg, Beddome cevm, Brandis 444, Gamble 70, *M tetracoccus,* Kurz ii 382 *Rottlera alba* and *tetracocca,* Roxb Fl Ind iii 829, 826 Vern *Marleya,* Sylhet, *Jogi mallata,* Nep, *Numbong,* Lepcha

A small evergreen tree with thin brownish grey bark Wood soft, white Pores moderate sized and large, often subdivided Medullary rays as in *M philippinensis.*

Sikkim Eastern Bengal Chittagong, Western Ghats Mysore and Ceylon

Weight, 31 lbs per cubic foot Leaves covered beneath with dense white tomentum

			lbs.
E	2422	Sivoke, Darjeeling Terai	31

3 M. Roxburghianus, Mull Arg, Kurz ii 383, Gamble 70 *Rottlera peltata,* Roxb Fl Ind iii 828 Vern *Kamli mallata, phusri mallata,* Nep, *Nim pooteli,* Beng, *Sirgúllum,* Sylhet

A small evergreen tree Wood white, moderately hard, close grained Pores small, often in radial lines, uniformly distributed Medullary rays uniform, fine, very numerous, equidistant Faint transverse bars

Pilari, Mar.; *Kat kumbla*, Kan.; *Hruprukban*, Magh; *Thitmyoke, ye-myot*, Burm.

A deciduous tree. Bark smooth, grey. Wood white, soft, not durable. Pores moderate-sized, subdivided and often elongated, the transverse diameter several times greater than the distance between the closely packed uniform, fine medullary rays.

Sub-Himalayan tract from the Jumna eastwards, ascending to 3,000 feet, Bengal, Burma, South India.

Weight, 28 to 29 lbs. Used for native drums and agricultural implements. Recognised by its opposite leaves, which resemble those of *Gmelina arborea.*

			lbs.
E	2468.	Calcutta	29
B	311.	Burma (1867)	28

14. MALLOTUS, Loureiro.

A genus of trees or shrubs with large, often peltate, leaves. Most of them are of no importance, and only a few are common. The following list is taken from the Prodromus, from Dr. Müller's Monograph, wherein 22 Indian species are described:—

SECTION I. BLUMEODENDRON.

M. Tokbrai, Mül. Arg. (*B. Tokbrai*, Kurz ii. 391) . Andamans.

SECTION II. ROTTLEROPSIS.

M. lappaceus, Müll. Arg. . . . . . . Burma.

…u-growth forest,

E 3397. The Park, Darjeeling, 6,500 feet.

15. MACARANGA, Pet. Thouars.

A genus of about 12 species of Indian trees or shrubs. They have large often peltate leaves, are fast growing, and chiefly found in old clearings, where they often come up gregariously. The following list gives Dr. Müller's species, those since described by Kurz being given in brackets:—

SECTION I. MAPPA.

. Andamans.
M. Tanarius, Müll. Arg. . . . . . Sikkim, Eastern Bengal.
M. gummiflua, Müll. Arg. . . . . . Sikkim, Burma.
M. denticulata, Müll. Arg. . . . . . Burma, Andamans.
M. Helferi, Müll. Arg. . . . . . . Andamans.
M. populifolia, Müll. Arg. . . . . .

SECTION II. EUMACARANGA.

M. indica, R. Wight . . . . . . Sikkim, Khasia Hills, Western Ghâts, Andamans.
Tinnevelly.
M. flexuosa, R. Wight . . . . Western Ghâts.
M. tomentosa, R. Wight . . . . . . Eastern Ghâts.
M. peltata, Müll. Arg. . . . . . . Tenasserim.
M. minutiflora, Müll. Arg. . . . . . Andamans.
(*M. andamanica*, Kurz) . . . . . . Martaban Hills, 4,000 to 6,000 feet.
(*M. membranacea*, Kurz) . . . . . .

Fine, uniform, closely packed medullary rays, pores small, in radial lines, in some species numerous faint transverse bars

1. M philippinensis, Mull Arg, Beddome t 289, Brandis 444, Kurz ii 381, Gamble 70 *Rottlera tinctoria*, Roxb Fl Ind iii 827 Vern *Kamela, kamal, kambal, kumila*, Pb, *Ruen, riuna, roli*, Kumaun, *Rohni*, Oudh, *Reoni*, Banda, *Rauni, rori*, C P, *Púnag, tung, kishur*, Beng, *Sinduria*, Nep, *Puroa, tukla*, Lepcha, *Baraiburi, sindurpong*, Mechi, *Chinderpang, machugan*, Garo, *Gangai puddum*, Ass, *Kumala, sundragundi* Uriya, *Kapli, kavila*, Tam, *Kumkuma, vassuntagunda, chendra, sinduri*, Tel, *Koku*, Gondi, *Kuiku, corunga manje, sarualasari, hulichellu*, Kan, *Shendri*, Mar, *Ponnagam*, Mal., *Hamparandella*, Cingh, *Tau theedin*, Burm

A small tree Bark ¼ inch thick, grey, inner substance red, marked by irregular cracks Wood smooth, grey to light red, hard, close grained, no heartwood Annual rings indistinct Pores small, uniformly distributed, scanty, often subdivided Medullary rays uniform, very fine, very numerous, equidistant, the distance between them less than the diameter of the pores Faint indications of transverse bars

ing to 4 500 feet Bengal

The bark is used d for dye ng s lk Exhi bition List of 1878 that he described the structure of the grains of Kamela in the *Madras Q arterl Jo r al of Medical S*... per inch of that they consist of a red s bstance reaches i cubic foot scanty — —

		lbs
E 2425	Tukdah Forest Darjeeling 5 000 feet	29

3. M gummiflua, Mull Arg, Gamble 70 Vern *Jogi mallata*, Nep, *Chakro*, Gáro, *Burua*, Chittagong, *Pawaing*, Magh

A small tree, often gregarious Bark grey, smooth Wood greyish red, soft, in structure similar to that of *M indica*

Sikkim from 3 000 to 6 000 feet Eastern Bengal

Growth fast our specimen shewed 3 rings per inch of radius Weight, 22 lbs per cubic foot Wood used for similar purposes to that of *M denticulata*

		lbs
E 2426	Pugraingbong, Darjeeling, 5 000 feet	22

16 RICINUS, Linn

1. R communis, Linn, Roxb Fl Ind iii 689, Brandis 445, Kurz ii 400, Gamble 71 The Castor Oil Plant or Palma Christi Vern *Rand, arand, arendi, ind*, Hind, *Aneru*, Chenab, *Harnauli*, Salt Range, *Ind rendi*, Kumaun, *Orer*, Nep, *Rallop*, Lepcha, *Sittamunuk*, Tam, *Amadum, amdi sittamindi*, Tel, *Nerinda*, Gondi, *Haralu*, Kan, *Kyeksu*, Burm

A large shrub or small tree Bark thin, light greyish brown Wood white, soft, light, with large central pith Pores moderate sized, scanty, uniformly distributed, often subdivided Medullary rays numerous, fine to moderately broad.

Indigenous in Arabia and North Africa, cultivated throughout India and often found run wild.

Usually cultivated for the oil which is expressed from its seeds, and which is so largely used for burning, for lubricating machinery and in medicine.

It is also grown for its leaves, which are used for feeding silkworms. The 'Eri' silk of Assam produced by *Attacus Ricini* fed on the leaves of the castor oil plant, gives a beautiful fine silk, used to make wearing apparel by the Assamese and Mechis.

E 3277. Naltanpara, Western Dúars.

17. HOMONOYA, Loureiro.

Three species. *H. retusa*, Müll. Arg.; Beddome ccxii.; Brandis 445, is a small shrub of river banks in South India.

1. H. symphylliæfolia, Kurz; Gamble 71. Vern. *Bajadanti*, Nep.; *Ching*, Lepcha.

A moderate-sized evergreen tree. Bark very thin, white or light grey, peels off in thin flakes. Wood yellowish white, hard, smooth, close-grained. Annual rings indistinct. Pores very small, numerous, uniformly distributed, sometimes in radial lines. Medullary rays very fine, very numerous. Few concentric lines (?).

Damp forests of the lower Darjeeling Hills.

Weight, 54 to 59 lbs. per cubic foot. The section of the stem is very irregular, presenting deep sinuosities. The wood is hard and tough, and is used for punting poles by the Tista boatmen. It is recommended for trial as a substitute for boxwood.

		lbs.
E 496.	Khookloong Forest, Darjeeling	54
E 2429.	Tista Valley, near Sivoke, Darjeeling	59

2. H. riparia, Lour.; Beddome ccxii.; Brandis 445; Kurz ii. 401; Gamble 71. *Adelia neriifolia*, Roxb. Fl. Ind. iii. 849. Vern. *Kandágar*, Kumaun; *Khola ruis*, Nep.; *Mongthel*, Lepcha; *Taniki*, Tel.; *Sundeh*, Gondi; *Jeljambu*, Kurku; *Kat-alluri*, Mal.; *Momakha, yay-ta-gyeeben*, Burm.

A small shrub. Bark brown. Wood grey or greyish brown, moderately hard, close-grained. Pores scanty, moderately large, often subdivided. Medullary rays of two classes: few moderately broad and short, and numerous long, fine rays, which, as a thin section, appear as a succession of small black cells.

Rocky and stony river beds throughout India.

Weight, 40 lbs. per cubic foot.

		lbs.
E 3303.	Sivoke, Darjeeling Terai	40

18. JATROPHA, Linn.

About 4 species: *J. Wightiana*, Müll. Arg., is a small shrub of South India. *J. nana*, Dalz., is an undershrub of stony places in the Dekkan. *J. glandulifera*, Roxb. Fl. Ind. iii. 688; Kurz ii. 403 (*Addalay*, Tam.; *Nela-amida*, Tel.) is a shrub common near villages in Bengal and Burma. The seeds give an oil which is used in medicine. *J. multifida*, Linn., the Coral Plant, is much grown in gardens for its handsome scarlet flowers and deeply-cut leaves.

1. J. Curcas, Linn, Roxb Fl Ind iii 686, Brandis 442, Kurz ii. 403, Gamble 71 The Physic Nut Vern *Bagberenda, safed ind,* Hind, Beng, *Kadam,* Nep, *Kaat amunak,* Tam, *Nepalam,* Tel, *Mara-narulle, maraharalu,* Kan, *Kaak avenako,* Mal, *Thinbau-kyeksu,* Burm.

A soft, wooded evergreen shrub Bark greenish white, smooth, peeling off in thin flakes Wood white, very soft Pores small, scanty, often subdivided Medullary rays extremely fine, very numerous

Indigenous in America cultivated in most parts of India

Weight 25 lbs per cubic foot Often used for hedges and planted near villages The juice of the leaves forms a lather like soap The seeds give an oil which is used for burning in medicine as a purgative and emetic, and as an application in cutaneous diseases

		lbs
E 2427	Manjha, Darjeeling Terai	25

19 GIVOTIA, Griff

1 G rottleriformis, Griff, Beddome t 285, Brandis 442 Vern. *Vendale, butalli, bulali,* Tam, *Tella punki,* Tel

A middle sized tree Wood white, exceedingly light, very soft but even grained Pores moderate sized, scanty, very prominent on a vertical section, often in concentric lines, annual rings marked by a line of larger, more numerous pores Medullary rays uniform, fine, short, the distance between the rays greater than the transverse diameter of the pores

Dekkan Mysore Eastern Ghats and Ceylon

Growth very fast, our specimen shews $1\frac{1}{2}$ rings per inch but the annual rings are somewhat doubtful Weight 14 lbs per cubic foot The wood is used to carve figures for toys imitation fruit and other fancy articles which are lacquered and painted also for catamarans The seed give an oil which is valuable for lubricating fine machinery

		lbs
D 3152	Cuddapah, Madras	14

20 OSTODES, Bl

Three species 274 Vern *Sotege* Has san, *Walkakoona,* tern Ghats and Ceylon O *Helferi* Mull Arg serim in the plains round Moulmein

1. O paniculata, Bl, Kurz ii 401, Gamble 72 Vern *Bepari,* Nep, *Palok,* Lepcha

A large evergreen tree Bark light grey Wood white, soft Pores scanty, small to large, subdivided Medullary rays very fine, uniform, closely packed

Forests of Sikkim from 2000 to 6000 feet, Khasia Hills and the Hills of Martaban

Growth moderate 8 to 9 rings per inch of radius Weight 26 lbs per cubic foot. It gives a gum which is used as size in the manufacture of paper

		lbs
E 3110	Darjeeling 6,000 feet	26

21. CHÆTOCARPUS, Thw.

1. C. castaneæcarpus, Thw. Enum. 275; Beddome t. 284; Kurz ii. 409. Vern. *Búlkokra*, Beng.; *Haddoka*, Cingh.

A moderate-sized tree. Wood light red, moderately hard, close-grained. Pores small, numerous. Medullary rays very fine, very numerous, traversed by narrow wavy concentric bands.

Khasia Hills, Eastern Bengal, Burma, Andaman Islands and Ceylon. Weight, 58 lbs. per cubic foot. Wood used in Ceylon for building.

	lbs.
No. 34. Ceylon Collection (*C. pungens*)	58

22. EXCÆCARIA, Linn.

The following list of species is taken from the 'Prodromus' of DeCandolle:—

SECTION I. TRIADICA.

E. sebifera, Müll. Arg.	Cultivated, Northern India.
E. baccata, Müll. Arg.	Sikkim, Eastern Bengal, Burma.

SECTION II. FALCONERIA.

E. insignis, Müll. Arg.	North India, South India, Burma.

SECTION III. SCLEROCROTON.

E. cochinchinensis, Lour.	South India.
E. virgata, Miq.	Martaban.
E. indica, Müll. Arg.	Sundarbans, Tenasserim.

SECTION IV. EUEXCÆCARIA.

E. oppositifolia, Jack.	Malabar, Mysore, Tenasserim.
E. Agallocha, Willd.	Bengal, South India, Burma, Andamans.
E. acerifolia, F. Didrichs	Kumaun, Nepal, Khasia Hills.
(*E. holophylla*, Kurz)	Martaban and Tenasserim.

E. acerifolia, F. Didrichs; Brandis 441. Vern. *Pútkiá*, Kumaun, is a large milky shrub, whose root is used as a cathartic.

Wood soft, spongy. Pores moderate-sized to large. Medullary rays very fine, uniform, closely packed. Faint concentric lines.

1. E. sebifera, Müll. Arg.; Brandis, 441; Gamble ii. *Carumbium sebiferum*, Kurz ii. 412. *Sapium sebiferum*, Roxb. Fl. Ind. iii. 693. The Chinese Tallow-tree. Vern. *Mom-china*, Beng.

A moderate-sized tree. Bark grey, with shallow, vertical cracks. Wood white, moderately hard. Pores small to large, often subdivided. Medullary rays very fine, very numerous, the distance between the rays less than the transverse diameter of the pores; the rays are traversed by numerous fine, wavy, concentric lines.

Indigenous and cultivated in China and Japan Introduced and cultivated throughout Northern India

Growth rather fast 6 rings per inch of radius (our specimen) Weight 32 lbs per cubic foot The white pulp round the seeds gives the Chinese tallow which is separated by boiling in water It is used in China and Japan for candles Roxburgh says it is bad for burning that it only remains firm at a cool temperature and that it easily becomes rancid It melts at 104° The seeds give an oil and the leaves a black dye It is a handsome tree, somewhat like Sissu in foliage, and often planted for ornament

			lbs
O 3114	Dehra Dun	•	32

2 **E baccata**, Mull Arg , Brandis 441, Gamble 72 *Carumbium baccatum*, Kurz ii 412 *Sapium baccatum*, Roxb Fl Ind iii 694 Vern *Pudlikat, lal kainjal*, Nep , *Adamsali*, Ass , *Billa*, Sylhet , *Linhlun* Burm

To this species probably belongs E 1962 from Chittagong, a soft grey wood, in structure resembling that of *E indica* , as well as E 3340 from Assam, called there *Tarsing*, Nep , *Selling*, Chota Nagpur coolies , *Larrna*, Assamese

A large evergreen tree of Northern and Eastern Bengal Chittagong and Burma Weight 28 lbs per cubic foot The bark is chewed by natives in Assam

3 **E insignis**, Mull Arg , Beddome ccxiv , Brandis 442 *C rumbium insigne*, Kurz ii 412 *Falconeria insignis*, Royle Vern *Dudla, bilodar, biloja, karalla, ledra*, Pb , *Khinna, khina lienda, lendwa*, Hind , *Garpa shola*, Anamalais

A small deciduous tree Bark grey, smooth, shining, with large, broad, longitudinal wrinkles Wood grey, very soft, spongy Annual rings faintly marked Pores moderate sized and large, subdivided, and often in short radial lines Medullary rays very fine, indistinct

Sub Himalayan tract from the Beas eastwards ascending to 4 000 feet Chittagong Burma and Western Ghâts as far north as Nasik

Weight 23 to 29 lbs per cub c
The whole tree is full of an

		lbs
H 103	Bhajji Simla 4 000 feet	29
H 615	Kulu 5 000 feet	23

4 **E indica**, Mull Arg , Beddome ccxv , Brandis 441, Kurz ii 413 *Sapium indicum*, Roxb Fl Ind iii 692 Vern *Hurua, batul*, Beng , *Kirri makalu*, Cingh

A small evergreen tree, with smooth, grey bark Wood soft, white, with small brown heartwood Pores moderate sized and large, oval, often subdivided Medullary rays equally distributed, very fine, closely packed The transverse diameter of the pores is greater than the distance between the rays

Sundarbans and tidal forests of Tenasserim and Ceylon
Weight 29 lbs per cubic foot The wood is used in the Sundarbans for fuel The juice of the tree is very poisonous and the seeds are used to poison fish

		lbs
E 409	Sundarbans	29

5. E. Agallocha, Willd.; Roxb. Fl. Ind. iii. 686; Beddome ccxv.; Brandis 442; Kurz ii. 414. Vern. *Gangwa, geor, uguru, geria*, Beng.; *Tayan, kayan*, Burm.; *Yekin*, Burm. in the Andamans.

A small evergreen tree which exudes poisonous milk. Wood very soft, spongy. Pores small, scanty, sometimes in radial lines. Medullary rays very numerous, extremely fine.

Coast and tidal forests of India, Burma and the Andaman Islands.

Weight, 26 lbs. per cubic foot. Home in his Sundarbans List of 1874 says: "Grows occasionally to 5 feet in girth and 40 feet in height, though generally cut for posts when of small girth. It is a useful wood for general carpentering purposes, such as toys, bedsteads, tables, &c., a white timber; the juice which exudes from the bark when green is very poisonous." Roxburgh says it is only used for charcoal and firewood.

			lbs.
E	396.	Sundarbans	24
B	2477.	Andaman Islands (Kurz, 1866)	28

23. EUPHORBIA, Linn.

About 11 species of Indian small trees or shrubs usually with thick, fleshy, angular branches and short gouty stems. *E. sessiliflora*, Roxb. Fl. Ind. ii. 471; Kurz ii. 415, is a fleshy undershrub of Pegu. *E. neriifolia*, Linn.; Beddome ccxvi.; Brandis 439; Kurz ii. 416; Gamble 72 (*E. ligularia*, Roxb. Fl. Ind. ii. 465). Vern. *Mausa sij*, Beng.; *Gangichú*, Pb.; *Thor*, Bombay; *Shasoung*, Burm., is a small tree with cylindric stem and 5-angled, spirally twisted stem, cultivated near villages in most parts of India. It is considered a sacred tree by the Mechis of the Sikkim Terai and Bhutan Dúars, and is consequently often found on deserted village sites. The milk is used in native medicine and the root to cure snake-bite. *E. Nivulia*, Ham.; Beddome ccxvi.; Brandis 439; Kurz ii. 417 (*E. neriifolia*, Roxb. Fl. Ind. ii. 467) Vern. *Sij*, Beng.; *Newrang*, Mar.; *Sha-soung*, Burm., is a shrub of dry and rocky sites in Garhwal, Sind, the Dekkan and Burma, with round branches. *E. antiquorum*, Linn.; Roxb. Fl. Ind. ii. 468; Beddome ccxvi.; Brandis 438; Kurz ii. 416. Vern. *Nara sij, tekata sij*, Beng.; *Tidhara*, Hind.; *Shidu*, Mechi; *Shasoung-pya-thal*, Burm.; *Dalúk*, Cingh., is a shrub with 3-angled branches, common on dry hills in Bengal and the Peninsula. *E. trigona*, Roxb. Fl. Ind. ii. 468; Beddome ccxvi; Brandis 438, is a small tree with 3-angled stems found on arid hills in Coimbatore. *E. tortilis*, Rottler; Beddome ccxvi.; Brandis 439, is a small tree of dry hills in South India, with 3-angled, spirally twisted branches. *E. Cattimandoo*, Elliot, Beddome ccxvi.; Brandis 438. Vern. *Katti mandu*, Tel., is a small tree with 5-angled branches common in Vizagapatam district, and yielding a copious milk, which is used as a cement. *E. Tirucalli*, Linn.; Roxb. Fl. Ind. ii. 470; Beddome ccxvii.; Brandis 439; Kurz ii. 417. Vern. *Lanka sij*, Beng.; *Sehnd*, Hind.; *Tiru kalli*, Mal.; *Sha-soung-leknyo*, Burm., is a small tree with round stems and smooth green branches, cultivated throughout India and used as hedges. The wood is strong and used for veneering and toys; the milk is very acrid. Skinner, No. 69, gives the weight 36 lbs., P = 618. He says that twigs thrown into a tank when the water is low intoxicate and kill the fish. *E. epiphylloides*, Kurz ii. 416, is a small tree of the Andamans. The well-known *E. pulcherrima*, Willd. or *Poinsettia pulcherrima* is a garden shrub with large crimson floral leaves, introduced from Mexico, and cultivated in gardens in most parts of India.

1. E. Royleana, Boissier; Brandis 438. *E. pentagona*, Royle. Vern. *Thor*, Punjab; *Sali*, Jhelam; *Chúla*, Chenab; *Chún*, Ravi; *Chú, chúnga, súrs*, Beas; *Súro, tsui*, Sutlej; *Sohúnd*, Kumaun.

A large, milky shrub. Wood spongy. Pores small, subdivided, scanty. Medullary rays extremely fine.

North-Western Himalaya, ascending to 6,000 feet.

It reaches 15-16 feet in height, the stems having 2-3, and often even 5-6 feet in girth.

It is often planted as a hedge and grows readily from cuttings, even on the driest soil

P 3075. Sabathu, Punjab

24. BUXUS, Tournefort.

1. B. sempervirens, Linn , Brandis 447. *B. Wallichiana,* Baillon. Vern. *Shanda laghúne,* Afg , *Chikri,* Kashmir , *Papri, papar, paprang, shamshád, shumaj,* Pb

An evergreen shrub or small tree. Bark grey, soft, corky, cut into small plates by deep irregular cracks. Wood yellowish white, hard, smooth, very close and even-grained Annual rings distinctly marked by a narrow line without pores. Pores extremely small, very numerous, uniform and uniformly distributed. Medullary rays fine to extremely fine, very numerous.

localities of boxwood in the North-West I... chief —

In the Punjab —

Rawul Pindi Division	Occasional in ravines of the Margulla Syudpore Range, but of small size, the largest being 6 inches and the average 4 inches in girth
Fuel Reserve, North	Scattered trees in the Talagang and Khusha forests
Beas Division	
	4 A locality in Seoraj, Kulu
	5 A locality in Balhan Koti
Sutlej Division	Trees and groups of trees between Wangtu and Kilba.
	A small forest to the north of the Shali Range

In the North-West Provinces —About 3 400 trees were counted in the forests

It is estimated that the cost per cubic foot of boxwood delivered at Saharanpur from the Kelso forest would be Re 1 8, its further cost by rail from Saharanpur to Bombay would be at least Re 1 8 or total Rs 3 per cubic foot Considering 1 cubic foot as weighing 60 lbs, we have the cost per ton as Rs 112, which could only be just ... of the very best description of wood were sent down. There is

1½ to 2 inches in 20 to 25 years. An examination of the specimens received by us shewed that the growth is extremely variable. We found—

H 990.	75 rings per inch of radius		Average of 8 specimens 33·5 rings per inch of radius.
H 424.	41 „ „ „		
H 930.	40 „ „ „		
H 614.	30 „ „ „		
H 2914.	27 „ „ „		
H 165.	25 „ „ „		
H 38.	16 „ „ „		
H 77.	14 „ „ „		

Weight, Brandis says, 60 to 65 lbs. per cubic foot; Mathieu, Fl. For., p. 268, gives 56 to 72 lbs.; our specimens average 57 lbs.

The uses of boxwood are well known. In Europe it is used for engraving, turning, carving and mathematical instruments. In the Himalaya small boxes to contain butter, honey, tinder, snuff, &c., are made of it, and it is carved into combs. The leaves are poisonous to cattle, only goats eat them sparingly with impunity; they are used in the south of France as manure for vineyards. The boxwood to be used for engraving requires very careful and lengthened seasoning; on this subject and on the other requisite characters of boxwood for commercial purposes, the following extract from a letter of Messrs. J. Gardner and Sons, of Liverpool, to the Inspector-General of Forests, dated April 3rd, 1877, will give information:—

"The value of boxwood at Bombay of suitable texture for the English market, of which latter we can judge from a few sample pieces, will depend principally upon the quality.

"Wood from 2 to 4 inches diameter is required to be free from splits or cracks, otherwise, however free from knots and straight and round it may be, the value would not exceed £1 to £2 per ton, whilst if free from splits, round and straight and with—

not exceeding one knot per foot in length	the value would probably be	£10 per ton,
exceeding 1 knot and not exceeding 2 knots		£7-10*s*. „
„ 2 knots „ „ 3 „		£5 „

all knots or holes, counted as such, however small.

"Wood 4 inches and upwards in diameter is preferred with one split rather than sound or with more than one split, any splits after the first reducing the value on account of the additional waste in working the same.

		Averaging per foot in length. 1 knot.	2 knots.	3 knots.
		£	£	£
The value of round and straight (1 split) averaging.	4 to 5 inches diameter	6	4-10*s*.	3
	5 to 6 „	9	6	3
	6 inches and upwards diameter	12	9	4-10*s*.

"If the splits are twisted more than 1 inch to the foot if small, 2 inches if medium size, and 3 inches to the foot length if large, the value is reduced one-half.

"The above values will, of course, vary in accordance with the supply and demand for the various sizes and qualities.

"The most suitable texture of wood will be found growing upon the sides of mountains. If grown in the plains, the growth is usually too quick, and consequently the grain is too coarse; the wood of best texture being of slow growth and very fine in the grain.

"It should be cut down in the winter, and, if possible, stored at once in airy wooden sheds, well protected from sun and rain, and not to have too much air through the sides of the shed, more especially for the wood under 4 inches diameter.

"The boxwood also must not be piled upon the ground, but be well skidded under, so as to be kept quite free from the effects of any damp from the soil.

"After the trees are cut down, the longer they are left exposed the more danger is there afterwards of the wood splitting more than is absolutely necessary during the necessary seasoning before shipment to this country.

"If shipped green there is great danger of the wood sweating and becoming mildewed during transit, which causes the wood afterwards to dry light and of a defective colour, and in fact rendering it of little value for commercial purposes.

"There is no occasion to strip the bark off, or to put cowdung or anything else upon the ends of the pieces to prevent their splitting.

"Boxwood is the nearest approach to ivory of any wood known, and will therefore probably gradually increase in value as it, as well as ivory, become scarcer It is now used very considerably in manufacturing concerns, but on account of its gradual advance in price during the past few years, cheaper woods are in some instances being substituted

"Small wood under 4 inches is used principally by flax spinners for rollers and by turners for various purposes, rollers for rink skates, &c &c and if free from splits is of equal value with the larger wood It is imported here as small as 1¼ inches in diameter, but the most useful sizes are from 2½ to 3½ inches and would therefore, we suppose, be from 15 to 30 or 40 years in growing, whilst larger wood would require 50 years and upwards at least, perhaps we ought to say 100 years and upwards It is used principally for *shuttles* for weaving silk linen and cotton, and also for rule

			lbs
H	930	Hazara, 7,000 feet	59
H	165	Kangra (Stewart 1866)	58
H	168	Shahpur " "	
H	614	Kulu 7,000 feet	56
H	951	Kunawar	
H	990	,	54
H	38	Kandru, Simla, 8 000 feet	60
H	77	Shali, Simla, 7 000 feet	57
H	2914	, " "	
H	424	Darua block, Deoban, North Western Provinces 6 800 feet	55

25 SARCOCOCCA, Lindl.

Two species, *S saligna*, Mull Arg, with tri nerved and *S Hookeriana*, Baill, with penniveined leaves The latter is a shrub of the hills of Sikkim

1. S. saligna, Mull Arg, Beddome ccxvii, Brandis 448, Gamble 72 Vern *Sukat sing*, Kumaun, *Chilikat*, Nep

A small evergreen shrub Wood white, moderately hard Pores very small and extremely small Medullary rays fine and moderately broad

Afghanistan Himalaya at 4 000 to 7,000 feet, ascending in Sikkim to 9 000 feet, Khasia Hills, Nilgiris and Western Coast

Wood sometimes used for walking sticks

H 2832 Simla 7 000 feet

Order XCVI. BETULACEÆ.

Two genera, *Betula* and *Alnus*. Himalayan trees, with similar qualities to the Birches and Alders of Europe.

Wood soft, tough to cut. Pores small, uniformly distributed. No distinct heartwood.

1. BETULA, Tournefort.

Three Indian species. The common European Birch is *B. alba*, Linn., and the American Paper Birch, of which the light, portable canoes are made in Canada, is *B. papyracea*, Willd.

Wood tough, close-grained, moderately hard. Pores small, not numerous. Medullary rays fine. Medullary patches scanty.

1. B. Bhojpattra, Wall.; Brandis 457; Gamble 79. *B. Jacquemontii*, Spach. Vern. *Búrj, burzal, bhúj, phurz*, Pb.; *Shák, pád, phatak, takpa*, Ladak, Lahoul, Piti, Kanawar; *Takpa*, Bhutia; *Bhújpattra*, Hind.; *Phuspat*, Nep.

A moderate-sized deciduous tree. Bark smooth, shining, with white oblong lenticels, the outer bark consisting of numerous distinct, thin, papery layers, peeling off in broad horizontal rolls. Wood white with a pinkish tinge, tough, even-grained, moderately hard. Pores small, not numerous, uniform and uniformly distributed except that sometimes they are arranged in interrupted lines along the edges of the annual rings. Medullary rays fine and very fine, numerous, prominent on a radial section.

Higher ranges of the Himalaya, forming the upper edge of arborescent vegetation and ascending to 14,000 feet.

Growth slow, the countings taken from our specimens were very uniform, 5 specimens varying only from 13 to 18 rings, giving an average of 15 rings per inch of radius. Aikin, in Wallich's List, gives 3·4 rings per inch. In weight, also, the experiments of Dr. Warth on six specimens gave only a variation from 42 to 46 lbs. with an average of 44 lbs.; Wallich gave 35·5 lbs. per cubic foot.

The wood is extensively used in the inner arid Himalaya for building; it is elastic, seasons well and does not warp. The bark is very valuable; it is used as paper for writing and packing, for umbrellas, hooka tubes, and for roofing houses. The branches are made into twig bridges, and the leaves are lopped for cattle-fodder.

			lbs.
H	909.	Upper Chenab, 10,000 feet	45
H	610.	Lahoul, 10,000 feet	44
H	126.	Rotang Pass, Kulu, 9,000 feet	42
H	127.	Monali, Kulu, 8,000 feet	46
E	381.	Tonglo, Darjeeling, 10,000 feet	44
E	2404.	" " "	43

2. B. acuminata, Wall.; Brandis 458; Kurz ii. 476; Gamble 79. Vern. *Púya udish, hambar máya, makshéri, sheori, shag*, Pb.; *Bhújpattra, háur, shául*, Hind.; *Haoul*, Kumaun; *Shakshin*, Tibet; *Saver, sauer, payong, útis*, Nep.; *Hlosungli*, Lepcha; *Dingleen*, Khasia.

A large tree. Bark grey, peeling off in horizontal rolls. Wood white, moderately hard, close-grained. Pores small and very small, often subdivided; numerous in the inner part of each annual ring, scanty and smaller in the outer half. Medullary rays fine.

Himalaya, from 6,000 to 8,000 feet, Khasia hills, and hills of Martaban.

ound in
ib c foot
for all

		lbs
H 611	Parbatti Valley K lu 8 000 feet	41
H 2914	Naghanda S mla 8 000 feet	41
E 2405	Darjeeling 7 000 feet	

3 **B cylindrostachys**, Wall Gamble 80 Under *B acuminata*, Wall in Brandis For Flora 458, Kurz ii 476 Vern *Shaoul*, Kumaun, *Sauer*, Nep, *Su gli* Lepcha

A tall deciduous tree Bark pink, peeling off in large vertical flakes, giving the stem a shaggy appearance Wood red hard heavy Annual rings indistinct Pores scanty, small, often subdivided uniformly distributed Medullary rays fine, numerous the distance between the rays larger than the transverse diameter of the pores

The wood
for which
branches

		lbs
E 678	Bamunpokri Darjeeling Terai	52

2 ALNUS, Tournefort

Two species The chief European Alders are *A glutinosa* Linn with glutinous leaves and *A incana* Willd with pubescent leaves

Pores small, uniformly distributed often in radial lines Medullary rays of two classes the broad rays composed of numerous fine rays Medullary patches scanty (common in some of the European species)

1 **A nitida**, Endl, Brandis 460 Vern *Gira*, Afg, *Shrol, saroli, sawali, rikunra, cha nb chapu, piak, k insa, kunidash, niu, kosh, rajan*, Pb, *Paya udesh*, Kumaun

A large tree Bark brown rough with deep furrows Wood reddish white, soft close and even grained, tough to cut, annual rings distinctly marked by harder wood near the inner edge of each ring Pores small, numerous, uniformly distributed, arranged in radial lines Medullary rays of two classes, a few broad rays at considerable intervals with numerous fine rays between them, the broad rays, which consits of a large number of small, closely packed rays, are marked as irregular shining plates on a radial section Medullary patches scanty

28 to 31 lbs per
cub
rope bridges
for dyeing and
tanning

		lbs.
H 119	Vazi i Rupi 6 000 feet	28
H 147	Sainj Sunla 4 000 feet	31

2 **A nepalensis**, D Don, Brandis 460, Kurz ii 476, Gamble 80 Vern *Kohi*, Pb *Udesh*, Kumaun *Ulis, utis*, Nep, *Kowal*, Lepcha

A large deciduous tree Bark thick, outside silvery grey, resembling

that of the birch. Wood similar to that of *A. nitida*, but the pores are fewer and somewhat larger, and the broad medullary rays are very broad and very numerous. No medullary patches.

Himalaya, from the Ravi eastwards, between 3,000 and 9,000 feet, Khasia Hills.
Growth fast, our specimens shew 3·6 rings per inch of radius; a round in the Bengal Forest Museum shews 2·4 rings. Aikin, in Wallich's List, mentions 2 specimens, one giving 11·8 rings, the other 2·7 rings per inch. Weight, 27 to 28 lbs. per cubic foot. The wood is not used, but as the tree is common and grows to a large size in the East Himalaya it might be used for tea-boxes. The bark is used for dyeing and tanning.

			lbs.
H	83.	The Glen, Simla, 6,000 feet	28
E	356.	Tukdah Forest, Darjeeling, 5,000 feet	27
E	2106.	" " " "	...

Order XCVII. SALICINEÆ.

Two genera, *Salix* and *Populus*. With one or two exceptions, all Himalayan trees.

Wood soft, even-grained. Pores small, numerous. Medullary rays fine.

1. SALIX, Tournef.

About 33 species, with very few exceptions confined to the Himalaya. They are mostly small, often prostrate shrubs, but in the arid regions of the inner Himalaya are of great use for firewood, bridges, basket-work and other purposes, and are often planted, as their quick growth and ready reproduction, either by cuttings or in coppice, ensures a constant supply of wood. The following list of the Indian species has been extracted from N. J. Anderson's Monograph in vol. xvi., p. 2, of DeCandolle's Prodromus.

The European species of willow, which are very numerous, belong to two sections, the "Sallows," the type of which is *S. Caprea*, and the "Osiers," the type of which is *S. alba*. They are largely cultivated, and are in great use for all purposes, and especially for the protection of river banks and for basket-work.

Section I. Pleiandræ.

(Stamens 3 or more, free.)

S. tetrasperma, Roxb.	All India.
S. pyrina, Wall.	Nepal.
S. calostachya, And.	Hazara.
S. urophylla, Lindl.	Oudh.
S. populifolia, And.	India (?)
S. acmophylla, Boiss. (Brandis 463. Vern. *Bed*, Afg.; *Bada, bisu*, Pb.)	Afghanistan, Sind, Punjab.
S. fragilis, Linn.	Lahoul, Ladak.
S. alba, Linn.	Ladak, Kashmir.
S. babylonica, Linn.	Suliman Range, elsewhere cultivated.

Section II. Diandræ.

(Stamens 2, free.)

S. Caprea, Linn. (Brandis 467. Vern. *Bedmushk*, Pb. The leaves are used for sherbet)	Northern India, cultivated.
S. Wallichiana, And.	Himalaya.
S. sclerophylla, And.	Ladak, Dras.

S elegans Wall	North Western Himalaya
S hastata Linn (Brandis 467)	Kashmir to Kunawar, 9 000 to 15 000 feet
S daphnoides Vill	North Western Himalaya
S insignis And (Brandis 470 Vern *Bitsu*, Pb Gir Kashmir)	Kashmir Piti, 5 000 to 12 000 feet
S viminalis Linn	Inner Himalaya
S obscura And	Sikkim 9 000 to 14 000 feet
S Sikkimensis And	
S Daltoniana And	
S eriophylla And	Khasia Hills 4 000 to 5 000 feet
S eriostachya Wall	Nepal
S longiflora Wall	Sikkim 9 000 feet
S serpyllum And	Sikkim 10 000 to 14 000 feet
S flabellaris And (Brandis 471 A small procumbent shrub)	Dras Lahoul Kunawar, 11 000 to 15 000 feet
S Lindleyana Wall (Brandis 471 A small procumbent shrub)	Kumaun Nepal Sikkim, 11 000 to 16 000 feet
S calyculata Hook f	Sikkim 14 000 to 15 000 feet
S oreophila Hook f	Sikkim 15 000 to 16 000
S Thomsoniana And	Sikkim 10 000 feet

SECTION III SYNANDREÆ

(*Filamenta connata*)

S Cultivated in	Zanskar Ladak 13,000 feet
S	Kashmir Kistwar 6 000 to 11 000 feet
S divergens And	Kistwar Zanskar 12 000 feet
S angustifolia Wild (Brandis 47)	Afghanistan, Kashmir, Zanskar 7 000 to 12 000 feet

as in the
according
periments
species is
Forester

Vol v p 480)

S alba is also cultivated in the Western Himalaya Brandis says the wood is soft, white near the circumference yellow or brown towards the centre the medullary rays are fine and numerous the pores very numero

P = 602

Wood soft, even grained, white or light red Pores small, numerous, rarely subdivided, uniform and uniformly distributed, except that in most species they are more numerous in the inner belt of the annual ring Medullary rays numerous, fine, uniform Medullary patches frequent. The species can hardly be distinguished by the structure of their wood

1 S **tetrasperma,** Roxb Fl Ind iii 753, Beddome t 302, Brandis 462, Kurz ii 493, Gamble 81 Vern *Bel, bent, baishi*, Hind, *Laila, bains*, North Western India, *Bis, beis, bitsa, bin, bidu, bakshel*,

magsher, safedar, badha, Pb.; *Yír*, Kashmir; *Bilsa*, Oudh; *Pani jama*, Beng.; *Bhesh*, Gáro; *Bhi*, Ass.; *Wallunj, bacha*, Bombay; *Niranji*, Kan.; *Momakha*, Burm.

A moderate-sized deciduous tree. Bark rough, with deep vertical, rough, shining fissures. Heartwood red, soft, porous, even-grained. Annual rings indistinctly marked by concentric lines. Pores small, very numerous, uniformly distributed, sometimes subdivided. Medullary rays fine, numerous, not distinct.

Throughout India, on river banks and in moist places, and in the Himalayan valleys ascending to 6,000 feet.

Growth fast. In Minniken's report on the Delhi Bela Plantation the following measurements are given :—

		Trees.	Mean girth.	Height.	Age.
Compt. 3.	Kudsia	3	18 in.	25 ft.	6 years
„ 4.	Jaffar Khan	3	15 in.	...	6 „

or 2 to 2½ rings per inch of radius; our specimens shew 2 to 6 rings per inch of radius. Weight, Brandis' Burma List of 1862, No. 89, gave 37 lbs.; our specimens give 31 to 35 lbs. The wood is rarely used; it has been used for gunpowder charcoal; Mann says that in Assam it is used for posts and planks. The twigs are made into baskets and the leaves lopped for cattle fodder. The bark is said by Kurz to be used for tanning, and by Dalzell to be used as a febrifuge.

			lbs.
H	155.	Sainj, Giri Valley	35
H	99.	Bhajji, Sutlej Valley	32
O	1485.	Kheri, Oudh	32
O	1465.	Gonda, Oudh	35
C	2818.	Melghát, Berar	31
E	1256.	Tezpur, Assam	35

2. S. fragilis, Linn.; Brandis 466. Vern. *Tilchang*, Lahoul.

A tree with grey, deeply fissured bark. Wood with reddish heartwood. Annual rings marked by concentric lines.

H 141, from Lahoul, is probably this species. It is cultivated in Lahoul and Ladak. Growth moderate, 11 rings per inch of radius, but the growth is fast while young, and gradually gets slower as the tree ages. Our specimen was 50 years old, and had a girth of 30 inches. Weight, 28 lbs. per cubic foot.

3. S. babylonica, Linn.; Roxb. Fl. Ind. iii. 754; Brandis 465; Gamble 81. The Weeping Willow. Vern. *Bísa, bada, bed, katíra, majnún*, Pb.; *Giúr*, Kashmir; *Tissi, bhosi*, Nep.

A tree with pendent branches. Bark grey, ¼ to ½ inch thick. Wood white, annual rings marked by a belt of more numerous pores in the spring wood.

Commonly cultivated in North India. Said by Stewart to be indigenous in the Suliman Range.

Growth fast, our small specimen shews 5 rings per inch of radius; Stewart records 4 to 5 rings per inch of radius, and a girth of 4 feet as the average of 6 trees, 10 years planted out. The branches are made into baskets, and are used for weirs and the protection of canal banks. It is very commonly grown for ornament, and is readily reproduced by cuttings.

H 3060. Koti, Simla, 7,000 feet.

4. S. Wallichiana, And.; Brandis 468. Vern. *Bwir*, Pb.; *Bhains, bhangli, katgúli*, North-Western Provinces.

A large shrub with greenish grey bark. Wood white or pinkish white, structure that of the genus.

Afghanistan Kashmir Himalaya eastwards to Bhutan ascending to 9 000 feet Growth fast 6 rings per inch of radius Weight 32 lbs per cubic foot The branches are made into baskets

		lbs
H 2910	Nagkanda Simla 8 000 feet	32
H 3035		

5 S elegans, Wall , Brandis 466 Vern *Bail, blail, bhains,* Simla

A small shrub with pinkish wood Annual rings marked by a porous spring wood and by an autumn wood of firmer texture

North West Himalaya from 7 000 to 10 000 feet as far east as Nepal Lahoul

Weight 33 lbs per cubic foot Used for his and *S daphnoides* are often attacked by a brilliant orange coloured fungus which is *Lecythea salicina* Lev

		lbs
H 2842	Mahasu Simla 8 000 feet	33
H 2906	Nagkanda Simla 9 000 feet	

6 S daphnoides, Vill , Brandis 469 Vern *Bed, bidai, betsa, beli, bushan, bashal, bhail bheul, riudanu, shun, thail,* Pb , *Yur,* Kashmir , *Changma, chamma, malchang, kalchang,* West Tibet , *Richang, roangching, changkar,* Lahoul

A shrub or tree with smooth bark Heartwood red shining Annual rings marked by more numerous pores in the spring wood

North West Himalaya both on the outer ranges and in the inner arid tract It extends to the Alps and the mountains of Central Europe

Growth va able the gave from 10 to 15 rings Mathieu Fl For p 397 - for building pails tubs and tool ges in Piti Zanskar and Ladak and It is much grown in Lahoul from cut every third or fourth year and the bran

		lbs
H 2854	Mahasu Simla, 7 000 feet	
H 47	Kalashi Simla 7 000	30
H 66	Nagkanda Simla 8 000 feet	34
H 2905	9 000	...
H 3034	8 000	37
H 3036	8 000	33
H 142	Lahoul about 9 000 feet	34

7 S viminalis, Linn , Brandis 470 Vern *Bitsu,* Pb , *Kumanta* Lahoul

A shrub with shining, grey, slightly cracked bark, and white wood, with the structure of the genus

Inner arid Himalaya from the Jhelam to Sikkim (*S Smithiana* Willd) from 5 000 to 9 000 feet, cultivated in Lahoul Dras and Kunawar Common throughout Europe in osier beds

H 143 Lahoul about 9 000 feet

8 S sp (It may be near *viminalis*)

A deciduous shrub with smooth dark coloured bark and lanceolate leaves, covered beneath with white tomentum Wood soft, close grained, heartwood red Annual rings distinctly marked by an irregular belt of

numerous pores in the spring wood. Pores small and numerous in the spring wood, very small and scanty in the autumn wood. Medullary rays very fine, very numerous, uniform and equidistant.

Growth moderately slow, 13 rings per inch of radius.
Weight, 31 lbs. per cubic foot.

		lbs.
E 966.	Chumbi Valley, Tibet, about 8,000 feet	31

2. POPULUS, Tournef.

Five species. *P. nigra*, Linn.; Brandis 472. The Black or Lombardy Poplar. Vern. *Sufêda*, Pb.; *Frast*, Kashmir; *Prost, farsh, makkal*, Chenab; *Kramali, biúns, do*, Sutlej; *Yarpa, yúlatt, kabúl*, Ladak, is a large tree commonly planted in Afghanistan, Kashmir, the plains and hills of the Punjab, up to 12,500 feet in Ladak. Both varieties are fast growers, the Black Poplar attaining 80 feet in height with a diameter of 2 feet in 50 years. Both grow well from cuttings, and the leaves are lopped for cattle fodder. Mathieu, Fl. For. p. 428, gives the weight as 25 to 36 lbs. per cubic foot. *P. alba*, Linn.; Brandis 473. The Abele or White Poplar. Vern. *Sperdor, spelda*, Afg.; *Chitta bagnu, safedar, jangli frast, fras, prist, rikkan, sannún, chanún, múl*, Pb., is a large tree, wild and cultivated in the North-West Himalaya up to 10,000 feet, and extending to Afghanistan, Beluchistan and on into Europe. It is generally raised from cuttings, and the growth is very fast, reaching a diameter of 2 to 3 feet in 50 years. The wood of this and of *P. nigra* is used for the Afghan grape-boxes. Mathieu, Fl. For. p. 422, gives the weight as 28 to 44 lbs. per cubic foot. *P. tremula*, Linn.; Brandis 474, is the Aspen Poplar of Europe.

Wood soft, even-grained. Pores small, numerous, often subdivided, uniformly distributed, except that they are scanty and generally somewhat smaller in the autumn wood. Medullary rays very fine, uniform. Medullary patches scanty.

1. P. euphratica, Olivier; Brandis 474. Vern. *Bahan*, Sind, Pb.; *Patki*, Brahui; *Hodung*, Ladak.

A large deciduous tree. Bark thick, with irregular, vertical furrows. Sapwood white, heartwood red, often nearly black near the centre, moderately hard, compact, even-grained. Annual rings marked by a very narrow belt with fewer pores. Pores small, very numerous, uniformly distributed, often subdivided. Medullary rays very fine, uniform, equidistant, the distance between the rays equal to the transverse diameter of the pores.

Banks of the Indus in Sind, the Upper Valley of the Indus, and its tributaries in Tibet.

Growth rapid: Brandis says 3 to 4 rings per inch of radius; our specimens are evidently fast grown, but the rings very difficult to distinguish, they seem to shew about 4 to 6 per inch. Weight, our specimens shew 32 to 37 lbs. per cubic foot, some experiments made at Kandahar by Captain Call, R.E., with bars 1 ft. × 1 in. × 1 in. gave the weight 27·2 lbs. and 427 for the value of P (Indian Forester, Vol. v. p. 480.) The wood is largely used in Sind for building, turnery, lacquered boxes, but not for fuel for the river steamers, as its heating powers are not great. On the Euphrates and Tigris it is used for planking and boat-building, and in the Punjab for the lining of walls. The inner bark is made into gun-match in Sind, and the bark given as a vermifuge. The leaves are used for fodder for goats and cattle. In Ladak it is much prized for fuel. It coppices well and bears pollarding long; coppice shoots are often used as rafters in Sind.

		lbs.
P 883.	Múltan	32
P 1384.	Indus bank, Central Sind	37

2 P. ciliata, Wall, Brandis 475; Gamble 81. Vern. *Safeda, bagnu, phalja, phlassu, fulís, palúch, phalsh, ban phrastu, dud phras, asán, suáli, ríkkan, saki, pábe, chanún, krammal, kiambal, pahari pipal,* Pb, *Chelaun, chelún,* Simla, *Garpipal,* Kumaun, *Bangikat,* Nep., *Sungribong,* Lepcha.

A large deciduous tree Bark smooth when young, with deep, vertical fissures when old Wood grey or brownish grey, shining, soft. Annual rings marked by a belt of firm wood with scanty pores near the outer edge of each ring Pores small, numerous, often subdivided, and arranged in short, radial lines. Medullary rays uniform, very fine, very numerous.

...000 and 10,000 feet

7 ...

on an average, 29 5 lbs per cubic foot

leaves as fodder for goats The leaves are ...

turns them white, and gives to a group of trees a curious appearance This fungus is *Erysiphe Martii,* Lev.

			lbs
H	3138	Dungagalli, Hazara	..
H	34	Matiyana, Simla, 7 000 feet	35
H	2884.	Nagkanda, „ 8 000 „	30
H	770	Kalatop, Dalhousie, 7 000 feet	26
E	970	Chumbi Valley, Tibet, about 8,000 feet	27

3. P. balsamifera, Linn, Brandis 476. Vern *Phalsh, makkal, pakhshu, pakh, bút, kiamal,* Pb, *Berfu, changma, yarpa, magkal, mahal,* W. Tibet

A large tree Bark grey, thick, rough, with longitudinal fissures. Wood light grey, soft to moderately hard Annual rings distinctly marked Pores very small and numerous in the spring wood, extremely small, scanty, and in short radial and oblique lines in the firmer autumn wood. Medullary rays very fine, uniform, numerous

.4,000 feet Extends to Afghanistan,

, *30 rings per inch of radius* It gives a weight of 32 lbs per cubic foot The wood is grown for fuel in the inner and Himalaya the branches are lopped for cattle fodder The leaves and branches are full of balsamic juice, which also exudes on a fresh cut between the bark and the wood.

			lbs.
H	136	Lahoul, about 9,000 feet	32

, similar to th ... ng that of *P* ... s old, shewing ... ghed 30 lbs. per cubic foot.

Order XCVIII. CUPULIFERÆ.

Four Indian genera, *Quercus, Castanopsis, Carpinus* and *Corylus* Four other genera are found in the world three of which, *Castanea, Fagus* and *Ostrya,* contain

...

grown in various localities, and especially in a large number of places in the Punjab

and the hills of the North-West Provinces, in Darjeeling and in the Khasia Hills. The experiment is as yet quite recent, and results are not sufficiently certain yet; but considering the large number of plants now growing and many favourable reports, it is probable that the experiments will be successful in some localities. *Fagus sylvatica*, Linn., is the 'Beech' Tree of Europe; and *Ostrya carpinifolia*, Scop., the 'Hop Hornbeam' of the Mediterranean region.

Pores generally arranged in radial lines or tails (not in *Fagus sylvatica*, *Castanea Vulgaris* and *Corylus Colurna*); medullary rays generally of two classes, broad and fine (not in *Castanea Vesca*, *Castanopsis* and four species of Indian Oaks). Most species have a distinct heartwood, exceptions are *Corylus* and *Carpinus*.

1. QUERCUS, Linn.

A large genus, one of the most important, not only in India and Europe, but also largely represented in America, Japan, and other parts of the world. It contains nearly 300 known species, of which 30 to 40 are probably Indian. The following list is taken from Alphonse De Candolle's Monograph in the Prodromus, Vol. xvi., those lately described by Kurz being given in brackets:—

Section I. Lepidobalanus.

Q. Griffithii, Hook. f. and Th.	Khasia Hills, 5,000 to 6,000 feet.
Q. semecarpifolia, Sm.	North-West Himalaya, Nepal.
Q. Ilex, Linn.	North-West Himalaya, Afghanistan.
Q. dilatata, Lindl.	North-West Himalaya, Afghanistan.
Q. serrata, Thunb.	Nepal, Khasia Hills.
Q. lanuginosa, Don.	Kumaun, Nepal.
Q. incana, Roxb.	Outer North-West Himalaya.

Section II. Pasania.

Q. Amherstiana, Wall.; Kurz ii. 484. Wood used for boat building. Weight 58 lbs. (Wallich)	Upper Tenasserim.
[*Q. Falconeri*, Kurz, in Journ. As. Soc. Bengal xliv. p. 197; Burma For. Fl. ii. 485]	Assam, Tenasserim.
Q. mixta, Alph. DC.	Upper Tenasserim.
Q. fenestrata, Roxb.	Sikkim, Khasia Hills, Eastern Bengal, Tenasserim.
Q. dealbata, Hook. f. and Th. Vern. *Dingir*, Khasia	Nepal, Khasia, Hills, Eastern Bengal.
Q. spicata, Sm.	North-East Himalaya, Eastern Bengal, Burma.
[*Q. pachyphylla*, Kurz]	Sikkim.
Q. lappacea, Roxb.	Assam, Eastern Bengal, Burma.
Q [illegible]*ta*, Roxb.	Sikkim, Eastern Bengal, Burma.

Section III. [illegible]obalanus.

[illegible]DC.	Sikkim, 5,000 to 8,000 feet.
[illegible]	Khasia Hills, 5,000 feet.
[illegible]	Chittagong, Burma.
[illegible]	Sylhet, Burma.

Q annulata Sm	Himalaya Khasia Hills
Q lamellosa Sm	Nepal Sikkim Bhutan 6 000 to 9 000 feet
Q mespilifolia Wall Kurz ii 488	Ava, Prome Arracan Hills 4 000 to 5 000 feet
[Q Brandisiana Kurz ii 488]	Martaban to 4 000 feet

SECTION IV CHLAMYDOBALANUS

Q lanceæfolia Roxb	Sikkim Assam Eastern Bengal

[Q xylocarpa Kurz in Journ As Soc Beng xl v 196]	Arracan
[Q eumorpha Kurz ii 487]	Martaban Hills 6 000 to 7 000 feet
[Q bancana Scheff Kurz ii 485]	Martaban Hills 3 000 to 5 000 feet
[Q Olla Kurz in Journ As Soc Beng xliv 197]	Assam
Q nov sp Vern Dingwa	Khasia Hills

The most important of the non Indian Oaks are described in Brandis For Fl pp. 483 to 487 and in other works such as Mathieu s Flore Forest ere we need therefore merely say that the British Oaks are *Q pedunculata* Ehrh and *Q sessiliflora* Sm usually ... Oak is *Q Suber* ... pro duced by ... The Vallonea O ... unning and dyeing is *Q Ægilops* Linn

Wood brown, very hard to extremely hard heavy generally with a distinct, darker coloured heartwood Pores small to large, arranged in irregular radial lines or elongated patches Annual rings very indistinct, and not marked as in the case of European oaks by a belt of larger pores in the spring wood (*Q Griffithii* and *Q, serrata* are an exception to this) As regards the medullary rays, two types may be distinguished In the first type (*Q pachyphylla fenestrata* and *lappacea*), there is only one class of medullary rays, all being very fine, very numerous, uniform and equidistant All other species have two classes, namely, besides the very fine rays already described, a small number of broad, or very broad, rays

First group —All medullary rays very fine, very numerous, uniform and equidistant Wood seasons well, does not warp or crack

Second group —Medullary rays of two classes, very fine and broad, the ... rise to that ap- ... The wood of most

1 Q Griffithii, Hook f and Th Vern *Dingim*, Khasia

A large deciduous tree Bark black, with deep vertical fissures Wood brown, very hard Annual rings marked by a belt of large pores in the spring wood. Pores small to moderate sized, large in the spring wood, gradually decreasing outwards, enclosed in patches or radial wavy groups of soft tissue Medullary rays of two classes numerous, fine, uniform and equidistant rays and few broad to very broad rays Very

numerous, fine, parallel, wavy, transverse lines. The wood of this oak more resembles that of the English oak than any other we have examined.

Khasia Hills at 5,000 to 6,000 feet.

Growth fast, judging from our small specimen, and from the size attained by planted trees at Mongpu, Darjeeling. The timber is much used in the Khasia Hills for building and other purposes.

E 3337. Shillong, Khasia Hills, 5,000 feet.

2. Q. semecarpifolia, Smith; Brandis 479. Vern. *Barchar, jangal ka parúngi*, Jhelam; *Kreu, khareu, krúi*, Chenab, Ravi; *Karshu, karsúi, karzu, sáuj*, Sutlej to Sarda; *Ghesi, kasru*, Nep.

A large evergreen tree with dark grey bark, often with protuberances arranged in horizontal lines. Heartwood grey, often with a reddish tinge, very hard. Annual rings marked by few somewhat larger pores in the spring wood. Pores small and very small, in long, narrow, wavy, radial bands. Medullary rays of two classes: very numerous, very fine, uniform, and equidistant rays; and very few, broad ones, not very prominent on a longitudinal section. Numerous faint, wavy, concentric bands.

Afghanistan, North-west Himalaya between 8,000 and 10,000 feet, Nepal, Bhutan.

Growth difficult to distinguish, but from our specimens it appears to be moderate. Brandis says, 10 to 15 rings per inch of radius, and Aikin, describing Wallich's specimens, gives 14 5 rings per inch. The rate of growth in the Deoban Forest was ascertained by counting the annual rings on 15 stumps of large trees. The result may be expressed as follows:—

Girth at five feet from the ground.	Corresponding radius (of wood only).	No. of rings.	No. of rings per inch of radius.
ft. in.	inches.		
1 6	2·9	40	13·8
3 0	5·7	86	15·1
4 6	8·6	138	16
6 0	11·5	192	16·7

This shews an increase of nearly 3 inches of radius every 50 years after the first 40, and an average growth of 15·4 rings per inch of radius.

The examination of *coppice* poles at an elevation of 9,000 feet in the same forest gave:

	Poles.	Average diameter. Inches.	No. of rings.
Jadi Block	27	4·7	32·8
Mohna	103	4·8	34·4

or a general average for 130 poles of 4·8 inches average diameter to 34 rings or 10·4 rings per inch of radius.

Weight, our specimens give 53 to 54 lbs. per cubic foot. The tree often grows to large size, and has a fine, straight stem, but the wood, though probably better than that of the other North-West Himalayan oaks, is not exported, and only but little locally used. It is used for building, door-frames, bedsteads, carrying poles, helves and ploughs, is a good firewood, and yields good charcoal. The leaves are stored as winter fodder for cattle. It coppices well and reproduces well from seed, and is often gregarious, forming considerable extents of almost pure forest.

			lbs.
H	39.	Mahasu, Simla, 9,000 feet	54
H	72.	Nagkanda, Simla, 9,000 feet	53
H	2893.	Nagkanda, Simla, 9,000 feet	...

No E 2464, sent by Dr Schlich from the Valley of Chumbi Tibet, between Sikkim and Bhutan, is a tree, the leaves of which resemble those of *Q semecarpifolia*, but are smaller and less tomentose beneath The wood is light coloured, the pores small, surrounded by soft tis ue in long radial anastomosing bands The wood resembles that of *Q Ilex*, which or near which species it probably is

3. Q. Ilex, Linn, Brandis 480 *Q Baloot*, Griff *Q Ballota* Desf The Holm Oak Vern *Chairei, serei, balit*, Afg, *Sperchei ei, pargai, kharanja*, Trans-Indus, *Chui, leharsu, kharen irri, yuru, heru, ban, bié, brekche*, Pb

A moderate sized evergreen tree Bark ¼ inch thick, dark grey, tesselated, and cut into quadrangular plates Heartwood red or reddish brown, very hard, durable Pores small, uniform, in irregular anastomosing, radial bands Medullary rays of two classes, numerous, very fine, uniform and equidistant rays, and fewer broad and very broad rays, the latter consisting of an agglomeration of finer rays, numerous fine, wavy, concentric rings of softer texture

Afghanistan Suliman Range and tracts of the Inner Himalaya generally between 3 000 and 8 500 feet Westwards to Southern Europe

H 1406 are annual of radius In 1880 Bagshawe counted i an average number at of the European tree varies between 60 and 69 lbs per cub c foot our three specimens g ve an average of 61 lbs but the third was old wood having been cut in 1867 Mathieu, Fl For p 325 gives the weight as varying from 55 to 74 lbs per cubic foot The wood warps and twists but when well seasoned it works admirably a d takes a fine polish It is largely used for tool ha dles and pieces are brought from the Suliman Range for that purpose It is used for agric lt ral implements and yields good fuel re used for fencing, and those The acorns are eaten in France,

			lbs
H	903	Upper Sutlej Valley 8 000 feet	62
H	953	Upper Sutlej Valley 8 000 feet	68
H	1406	Suliman Range (Stewart, 1867)	51
	2978	Dalmatia	

4. Q dilatata, Lindl, Brandis 482, Vern *Zaih*, Kafiristan, *Bán, banji, banchar, barachar, barain, banni, parungi, chora, kali ring, maru, maur, moru, marghang, karsk*, Pb, *Moru, tilangsa, kilonj, tilonj, timsha*, N-W P

A large tree, changing its leaves yearly in spring at the time of flowering, but not quite deciduous Bark dark grey, almost black, often with horizontal cracks, peeling off in longitudinal scales Heartwood reddish grey, with darker streaks, very hard, seasons well and does not warp much, faintly but elegantly marked on longitudinal sections by the medullary rays Pores small and very small, in groups, patches and irregular radial lines Medullary rays of two classes, the broad rays more frequent, but narrower than those of *Q incana*, the others are very fine, very numerous, uniform and equidistant Fine, wavy, concentric bands irregularly distributed

Afghanistan Suliman Range, North West Himalaya, between 7,000 and 9 000 feet. Growth moderate at first probably slow afterwards, the annual rings are not sufficiently marked for counting Weight, 61 lbs per cubic foot. Major Lang gives

P. = 670. The wood is durable, and is used for building, for agricultural implements and jampan poles. The leaves are much lopped for fodder for sheep and goats, and unlopped forests are rare. Near Simla, the chief localities where forests, pure or almost pure, of this tree are seen, are at Mahasu and on the east side of the ridge between Theog and Matiyana. The latter forest contains fine trees, and is very interesting.

The tree coppices well, and reproduces abundantly naturally, but the seedlings, when once established, require light to be let in, or they die off.

			lbs.
H	935.	Hazara, 8,000 feet	61
H	4.	Mahasu, Simla, 8,000 feet	56
H	40.	Mahasu, Simla, 8,000 feet	69
H	2845.	Mahasu, Simla, 8,000 feet	58
H	2873.	Nagkanda, Simla, 9,000 feet	...

5. Q. serrata, Thunb.; Brandis 486. *Q. polyantha,* Ldl. Vern. *Dingrittiang,* Khasia.

A moderate-sized deciduous tree. Bark dark grey, rough when old, light silver grey and shining when young, deeply cleft with vertical fissures. Wood brown, very hard. Annual rings marked by a belt of large, sometimes very large, pores in the spring wood. Pores small to moderate-sized, increasing gradually to large and very large to the edge of the spring wood, enclosed in patches or radial wavy groups of soft tissue. Medullary rays of two classes: numerous fine, uniform and equidistant rays and fewer broad, very short rays. Very numerous fine, parallel, wavy, transverse lines. This much resembles *Q. Griffithii* in structure and also comes near that of the English oak. A Japanese specimen has the same structure, but the annual rings much more distinctly marked.

North-East Himalaya and Khasia Hills, from 3,000 to 5,000 feet.

Growth, our specimen shews 9 rings per inch of radius. Wood used in Assam for building. In Japan the "*Yamamai*" silkworm is raised on its leaves.

E 3339. Shillong, Assam, 5,000 feet.

6. Q. lanuginosa, Don; Brandis 481. *Q. lanata,* Wall. Vern. *Ranj, rianj, rai banj,* Kumaun; *Banga,* Nep.

A large, evergreen tree. Bark ¼ inch thick. Wood greyish brown, very hard, warps and splits. Pores moderate-sized, in radial bands. Medullary rays of two classes, the broad rays prominent on a vertical section, giving the wood a handsome, mottled appearance. Numerous wavy, concentric lines.

Naini Tál and a few other places in Kumaun, between 6,000 and 7,500 feet. Gregarious, or associated with *Q. incana.*

Growth, annual rings not sufficiently recognizable for certainty, but if the lines on our specimen are annual rings, the growth was moderate, 7 rings per inch of radius. Weight, our specimen gives 55 lbs. per cubic foot. Wood used for firewood, the leaves for cattle fodder.

		lbs.
H 2968.	Naini Tál, 7,000 feet	55

7. Q. incana, Roxb. Fl. Ind. iii. 642; Brandis 482. Vern. *Vari,* Salt Range; *Rhin,* Hazara; *Rinj, ríp,* Jhelam; *Bán, banj,* Pb.; *Banj,* Kumaun.

A large evergreen tree. Bark dark coloured, rough, with cracks and fissures. Heartwood very hard, reddish brown, warps and splits. Annual rings indistinct. Pores small and moderate-sized, surrounded by

soft tissue and arranged in irregular patches and groups, and radial belts Medullary rays of two classes numerous, very fine, uniform, and equidistant rays, and fewer very broad rays visible on a radial section as high, narrow, tapering, shining plates Numerous faint, interrupted, wavy, thin, concentric lines

are greedily eaten by bears and monkeys which may to some extent account for its bad natural reproduction in spite of profuse seeding

			lbs.
H	*899*	Murree 7 000 feet	62
H	171	Kangra 6 000 (Stewart 1867,	
H	1	Simla 7 000 feet	67
H	24		66
H	2867		
H	2	Mahasu Simla, 7 000 feet	60

8 **Q fenestrata,** Roxb Fl Ind iii 633 Brandis 489, Kurz ii 483, Gamble 78 Vern *Kala chakma,* Beng, *Patle katus,* Nep, *Kashiendung,* Lepcha, *Dingjing,* Khasia, *Thitkya,* Burm

A moderate sized tree Bark ½ inch thick, rough greyish brown, deeply fissured into small rectangular plates Heartwood red, very hard Pores large, arranged in groups, and short or oblique belts Medullary rays very numerous, very fine, uniform and equidistant Numerous wavy, concentric bands

Eastern Himalaya between 5 000 and 8 000 feet Khasia Hills Eastern Bengal and hills of Martaban and Upper Tenasserim

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			lbs
E	3338	*Shillong Khasia Hills 5 000 feet*	
B	552	Martaban Hills „	56

9 **Q spicata,** Smith, Brandis 489, Kurz ii 486, Gamble 78 *Q squamata,* Roxb Fl Ind iii 638 Vern *Danwa singali, phaco singali, arkaula* Nep, *Bara chakma,* Beng, *Kacheeng,* Lepcha, *Sah-i hingori,* Ass, *Dingjing,* Khasia, *Thitcha,* Burm

A large, evergreen tree Wood red, very hard Bark grey, smooth Pores moderate sized and large, enclosed in soft tissue in groups, patches and radial belts *Medullary rays of two classes numerous very fine,* uniform and equidistant rays, and fewer broad and very broad ones, the silver grain being very prominent on a radial section Very numerous fine, parallel, wavy, transverse lines

Nepal Sikkim up to 5 000 feet Eastern Bengal Burma and Indian Archipelago Growth annual rings not recognisable Weight 58 lbs per cubic foot The wood is used for building in Assam and for charcoal in Darjeeling It coppices very freely and is often almost gregarious or mixed with chestnut *Engelhardtia* and *Schima* It is very durable and does not warp

P. = 670. The wood is durable, and is used for building, for agricultural implements and jampan poles. The leaves are much lopped for fodder for sheep and goats, and unlopped forests are rare. Near Simla, the chief localities where forests, pure or almost pure, of this tree are seen, are at Mahasu and on the east side of the ridge between Theog and Matiyana. The latter forest contains fine trees, and is very interesting.

The tree coppices well, and reproduces abundantly naturally, but the seedlings, when once established, require light to be let in, or they die off.

			lbs.
H	935.	Hazara, 8,000 feet	61
H	4.	Mahasu, Simla, 8,000 feet	56
H	40.	Mahasu, Simla, 8,000 feet	69
H	2845.	Mahasu, Simla, 8,000 feet	58
H	2873.	Nagkanda, Simla, 9,000 feet	...

5. Q. serrata, Thunb.; Brandis 486. *Q. polyantha,* Ldl. Vern. *Dingrittiang,* Khasia.

A moderate-sized deciduous tree. Bark dark grey, rough when old, light silver grey and shining when young, deeply cleft with vertical fissures. Wood brown, very hard. Annual rings marked by a belt of large, sometimes very large, pores in the spring wood. Pores small to moderate-sized, increasing gradually to large and very large to the edge of the spring wood, enclosed in patches or radial wavy groups of soft tissue. Medullary rays of two classes: numerous fine, uniform and equidistant rays and fewer broad, very short rays. Very numerous fine, parallel, wavy, transverse lines. This much resembles *Q. Griffithii* in structure and also comes near that of the English oak. A Japanese specimen has the same structure, but the annual rings much more distinctly marked.

North-East Himalaya and Khasia Hills, from 3,000 to 5,000 feet.

Growth, our specimen shews 9 rings per inch of radius. Wood used in Assam for building. In Japan the "*Yamamai*" silkworm is raised on its leaves.

E 3339. Shillong, Assam, 5,000 feet.

6. Q. lanuginosa, Don; Brandis 481. *Q. lanata,* Wall. Vern. *Ranj, rianj, rai banj,* Kumaun; *Banga,* Nep.

A large, evergreen tree. Bark $\frac{1}{4}$ inch thick. Wood greyish brown, very hard, warps and splits. Pores moderate-sized, in radial bands. Medullary rays of two classes, the broad rays prominent on a vertical section, giving the wood a handsome, mottled appearance. Numerous wavy, concentric lines.

Naini Tál and a few other places in Kumaun, between 6,000 and 7,500 feet. Gregarious, or associated with *Q. incana.*

Growth, annual rings not sufficiently recognizable for certainty, but if the lines on our specimen are annual rings, the growth was moderate, 7 rings per inch of radius. Weight, our specimen gives 55 lbs. per cubic foot. Wood used for firewood, the leaves for cattle fodder.

		lbs.
H 2968.	Naini Tál, 7,000 feet	55

7. Q. incana, Roxb. Fl. Ind. iii. 642; Brandis 482. Vern. *Vari,* Salt Range; *Rhin,* Hazara; *Rinj, ríu,* Jhelam; *Bán, banj,* Pb.; *Banj,* Kumaun.

A large evergreen tree. Bark dark coloured, rough, with cracks and fissures. Heartwood very hard, reddish brown, warps and splits. Annual rings indistinct. Pores small and moderate-sized, surrounded by

soft tissue and arranged in irregular patches and groups, and radial belts Medullary rays of two classes numerous, very fine, uniform, and equ distant rays, and fewer very broad rays visible on a radial section as high, narrow, tapering shining plates Numerous faint, interrupted, wavy, thin, concentric lines

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not recognisable from the spe imens We ght 64 lbs per cubic foot average of our The wood is very difficult to season it is iel and makes good charcoal The acorns s which may to some extent account for fuse seed ng

			lbs.
H	899	Murree 7 000 feet	62
H	171	Kangra 6 000 (Stewart 1867,	
H	1	Simla 7 000 feet	67
H	24		66
H	2867		
H	2	Mahasu Simla 7 000 feet	60

8 **Q fenestrata,** Roxb Fl Ind iii 633, Brandis 489, Kurz ii 483, Gamble 78 Vern *Kala chakma*, Beng , *Patle katus*, Nep , *Kashiendung*, Lepcha , *Dingjing*, Khasia , *Thitkya*, Burm

A moderate sized tree Bark ½ inch thick, rough, greyish brown, deeply fissured into small rectangular plates Heartwood red, very hard Pores large, arranged in groups, and short or oblique belts Medullary rays very numerous, very fine, uniform and equidistant Numerous wavy, concentric bands

Eastern Himalaya between 5 000 and 8 000 feet Khasia Hills Eastern Bengal and hills of Martaban and Upper Tenasserim

poses in the Khasia Hills

			lbs
E	3338	Shillong Khasia Hills 5 000 feet	
B	552	Martaban Hills	56

9 **Q spicata,** Smith, Brandis 489, Kurz ii 486, Gamble 78 *Q squamata*, Roxb Fl Ind iii 638 Vern *Danwa singali, phaco singali, arkaula* Nep , *Bara chakma*, Beng , *Kacheeng*, Lepcha, *Sah i hingori*, Ass , *Dingjing*, Khasia, *Thitcha*, Burm

A large, evergreen tree Wood red, very hard Bark grey, smooth Pores moderate sized and large, enclosed in soft tissue in groups, patches and radial belts Medullary rays of two classes numerous very fine, uniform and equidistant rays, and fewer broad and very broad ones, the silver grain being very prominent on a radial section Very numerous fine, parallel, wavy, transverse lines

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P. = 670. The wood is durable, and is used for building, for agricultural implements and jampan poles. The leaves are much lopped for fodder for sheep and goats, and unlopped forests are rare. Near Simla, the chief localities where forests, pure or almost pure, of this tree are seen, are at Mahasu and on the east side of the ridge between Theog and Matiyana. The latter forest contains fine trees, and is very interesting.

The tree coppices well, and reproduces abundantly naturally, but the seedlings, when once established, require light to be let in, or they die off.

			lbs.
H	935.	Hazara, 8,000 feet	61
H	4.	Mahasu, Simla, 8,000 feet	56
H	40.	Mahasu, Simla, 8,000 feet	69
H	2845.	Mahasu, Simla, 8,000 feet	58
H	2873.	Nagkanda, Simla, 9,000 feet	...

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North-East Himalaya and Khasia Hills, from 3,000 to 5,000 feet.

Growth, our specimen shews 9 rings per inch of radius. Wood used in Assam for building. In Japan the "*Yamamai*" silkworm is raised on its leaves.

E 3339. Shillong, Assam, 5,000 feet.

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		lbs.
H 2968.	Naini Tál, 7,000 feet	55

7. **Q. incana,** Roxb. Fl. Ind. iii. 642; Brandis 482. Vern. *Vari*, Salt Range; *Rhin*, Hazara; *Rinj, ríp*, Jhelam; *Bán, banj*, Pb.; *Banj*, Kumaun.

A large evergreen tree. Bark dark coloured, rough, with cracks and fissures. Heartwood very hard, reddish brown, warps and splits. Annual rings indistinct. Pores small and moderate-sized, surrounded by

soft tissue and arranged in irregular patches and groups, and radial belts. Medullary rays of two classes numerous, very fine, uniform, and equidistant rays, and fewer very broad rays visible on a radial section as high, narrow, tapering, shining plates. Numerous faint, interrupted, wavy, thin, concentric lines

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= 491 The wood is very difficult to season, it is ood fuel and makes good charcoal The acorns ionkeys which may to some extent account for of profuse seeding

			lbs.
H	899	Murree, 7 000 feet	62
H	171	Kangra 6 000 , (Stewart, 1867)	
H	1	Simla, 7,000 feet	67
H	24	" " "	66
H	2867	" " "	
H	2	Mahasu, Simla, 7,000 feet	60

8. Q. fenestrata, Roxb Fl Ind iii 633, Brandis 489, Kurz ii 483, Gamble 78 Vern *Kala chakma*, Beng, *Patle katus*, Nep, *Kashiendúng*, Lepcha, *Dingjing*, Khasia, *Thitkya*, Burm

A moderate sized tree Bark ½ inch thick, rough, greyish brown, deeply fissured into small rectangular plates Heartwood red, very hard Pores large, arranged in groups, and short or oblique belts Medullary rays very numerous, very fine, uniform and equidistant Numerous wavy, concentric bands

			lbs
E	3338	Shillong, Khasia Hills, 5 000 feet	
B	552	Martaban Hills	56

9. Q. spicata, Smith, Brandis 489, Kurz ii 186, Gamble 78 *Q. squamata*, Roxb Fl Ind. iii 638. Vern. *Danwa singali, phaco singali, arkaula*, Nep, *Bara chakma*, Beng, *Kacheeng*, Lepcha, *Sah hingori*, Ass, *Dingjing*, Khasia, *Thitcha*, Burm

A large, evergreen tree Wood red, very hard Bark grey, smooth Pores moderate-sized and large, enclosed in soft tissue in groups, patches and radial belts Medullary rays of two classes. numerous very fine, uniform and equidistant rays, and fewer broad and very broad ones, the silver grain being very prominent on a radial section Very numerous fine, parallel, wavy, transverse lines.

P. = 670. The wood is durable, and is used for building, for agricultural implements and jampan poles. The leaves are much lopped for fodder for sheep and goats, and unlopped forests are rare. Near Simla, the chief localities where forests, pure or almost pure, of this tree are seen, are at Mahasu and on the east side of the ridge between Theog and Matiyana. The latter forest contains fine trees, and is very interesting.

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			lbs.
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H	40.	Mahasu, Simla, 8,000 feet	69
H	2815.	Mahasu, Simla, 8,000 feet	58
H	2873.	Nagkanda, Simla, 9,000 feet	...

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North-East Himalaya and Khasia Hills, from 3,000 to 5,000 feet.

Growth, our specimen shews 9 rings per inch of radius. Wood used in Assam for building. In Japan the "*Yamamai*" silkworm is raised on its leaves.

E 3339. Shillong, Assam, 5,000 feet.

6. Q. lanuginosa, Don; Brandis 481. *Q. lanata*, Wall. Vern. *Ranj, ianj, rai banj*, Kumaun; *Banga*, Nep.

A large, evergreen tree. Bark ¼ inch thick. Wood greyish brown, very hard, warp... ...res moderate-sized, in radial bands. Medullary r... ...ys prominent on a vertical section, ...earance. Numerous wavy.

...and 7,500 feet. Gre-

...y, but if the lines on ... per inch of radius. ... firewood, the leaves

	lbs.
. .	55

...2. Vern. *Vari*, ...*nj*, Pb.; *Banj*,

...with cracks and ...and splits. An-...-sized, surrounded by

very hard. ...
...ranching lines, ...
marked by the larger ...
two classes: numerous, uniform ...
few broad ones.
...ya, Khasia Hills and down to Chittagong ... Weight of our specimen ...
per inch of radius. ...
low. The tree coppices well and is very ...
Darjeeling, 5,500 feet.
Darjeeling, 6,500 feet.

soft tissue and arranged in irregular patches and groups, and radi·*ata*,
Medullary rays of two classes numerous, very fine, uniform ·, *Pharonj*,
tant rays, and fewer very broad rays visible on a rad·Lepcha
narrow, tapering, shining plates. Numerous *f·, grey, smooth when*
thin, concentric lines res when old Wood grey
ks, a handsome, markedly

Outer Himalaya from the Indus to Nepal betwee-sized and small, surrounded
grown in the Panjab plains It is gregarious or c
and *Pieris*, and a few other species, such as *Co* es, and irregular radial lines
Weight, 64 lbs fine, uniform, equidistant
= 491 The wood Numerous, fine, wavy,
ood fuel and make v rays appear as broad
onkeys, which may w a silver grain on a
of profuse seeding

H	899	Murree, 7 000 feet	
H	171	Kangra 6 000 „ (Stewart, 1867,	chwal, Kumaun, Nepal,
H	1	Simla 7 000 feet	
H	24	„ „ „	iny sign of annual rings,
H	2867	„ „ „	per cubic foot the aver
H	2	Mahasu, Simla, 7,000 feet	North West Himalaya,

tlosa, but is not considered

8. Q. fenestrata, Roxb Fl Ind iii 63 ith 4 to 8 narrow, velvety
483, Gamble 78 Vern *Kala chakma*,
Kashiendung, Lepcha, *Dingjing*, Khasia, *T* lbs.
A moderate sized tree Bark ½ inc 55
deeply fissured into small rectangular n 62
Pores large, arranged in groups, and 57
rays very numerous, very fine, 60
wavy, concentric bands 69
836)" 59
„ 58

Eastern Himalaya between 5 0
hills of Martaban and Upper Ten Brandis 488, Gamble 78 *Q paucilamel-*
Growth, the annual rings are, Roxb Fl Ind iii 641 (from Penang)
7 rings per inch of radius Wei*ghalshi, pharat-singhali, budgrat*, Nep, *Buk*,
mistaken for *Q semiserrata* A
Thitkya) Wallich gives 47, a
poses in the Khasia Hills ark greyish brown, ⅓ to ½ inch thick *Heart-*
wing a beautiful silver grain on a radial section

E	3338	Shillong, K ne extent as *Q incana* and *Q annulata* Pores
B	552	Martaban ded by soft tissue, in loose radial strings Medul-

es numerous, very fine, uniform, equidistant rays
9. Q spicata, xtremely broad ones, showing on a radial section as
Q. squamata, Rox aped, shining plates Numerous, wavy, concentric
singali, arkaula, N
kingori, Ass, *D*
A large,
Pores moder
and radial b
uniform an
the silver gr
ous fine, pa
ed for tanning It often attains 100 to 120 feet
Nepal, Silfeet but old trees are very frequently
Growth, is often 2 to 3 inches in diameter and
is used for large, parallel veined, *sharply serrated*
and is often 2 or 3 years It is grown easily from
It is very d to be found eaten by grubs It often

and instances of more than one year being taken are common. It is being largely grown by planting in the Darjeeling Forests, where it is the principal and most important tree.

		lbs.
E 434.	Rangbûl Forest, Darjeeling, 7,500 feet	63
E 2452.	" " " " "	59
E 2453.	" " " " "	57
E 1438.	Mishmi Hills (Griffith, 1836)	57
E 1448.	" " " "	59

15. Q. lanceæfolia, Roxb. Fl. Ind. iii. 634; Brandis 489; Gamble 79. *Castanea lanceæfolia*, Kurz ii. 482. Vern. *Patlé katús*, Nep.; *Siri*, Lepcha; *Shingra, chauko*, Gáro; *Bucklai*, Ass.; *Hingori*, Cachar; *Dingsning*, Khasia.

A small evergreen tree. Wood greyish white, hard. Pores large, enclosed in soft tissue and arranged in wavy, radial and oblique lines. Medullary rays of two classes: numerous, very fine, uniform and equidistant rays, and few broad rays. Numerous, fine, wavy, concentric lines.

Sub-Himalayan tract, in Bengal and Chittagong, ascending to 4,000 feet.

Weight, 42 lbs. per cubic foot (Wallich and our specimens). Wood used for building in Assam. The acorns have thin, broad, ringed cups, which are set sideways on the branch; they have ruminate albumen.

		lbs.
E 1262.	Tezpur, Assam	42

2. CASTANOPSIS, Spach.

About 9 to 11 species. *C. javanica*, Alph. DC. (*Castanea javanica*, Bl.; Kurz ii. 479) is an evergreen tree of Burma. *C. Hystrix*, Alph. DC. Vern. *Dingsning*, Khasia, is a tree of the Khasia hills. *C. argentea*, Alph. DC.; Gamble 79 (*Castanea argentea*, Bl.; Kurz ii. 479.) Vern. *Hingori*, Ass., is an evergreen tree of Sikkim, Assam and Burma. *C. echidnocarpa*, Alph., DC., is a tree of the Khasia hills from 3,000 to 5,000 feet. *Castanea diversifolia*, Kurz ii. 479. Vern. *Kyanya*, Burm., is a tree of the Martaban hills, from 3,500 to 5,000 feet, and *C. Roxburghii*, Ldl.; Kurz ii. 480, is a large evergreen tree of Chittagong. *Castanea rhamnifolia*, Kurz and *C inermis*, Lindl.; Kurz ii. 481, are Burmese trees nearly allied to *Quercus lanceæfolia*.

The species of *Castanopsis* have a uniform structure which resembles that of the oaks with one class of medullary rays. Wood grey, moderately hard to hard, does not split or warp, seasons well, durable. Pores large, in wavy, radial bands, and lines very prominent on a vertical section. Medullary rays of one class, very fine, uniform and equidistant. Numerous, wavy, concentric lines.

1. C. indica, Alph. DC.; Brandis 490; Gamble 79. *Castanea indica*, Roxb. Fl. Ind. iii. 643; Kurz ii. 478. *Quercus serrata*, Roxb. l. c. 641 (probably) Vern. *Banj katús*, Nep.; *Kashiorón*, Lepcha; *Serang*, Ass.; *Charang*, Gáro; *Tailo*, Cachar; *Nikari, gol-shingra*, Sylhet.

A moderate-sized, evergreen tree. Bark silvery grey, ¼ inch thick, with regular equidistant longitudinal fissures. Wood grey, hard. Pores small to very large, arranged in wavy, interrupted, radial lines; the largest pores being often in the middle of each line. Medullary rays extremely fine, uniform, equidistant, very numerous. Numerous, fine, concentric lines of soft tissue.

ght Wallich
W = 35 lbs
ies is not de
s well and is
en pollarded
and the branches burnt for manure The fruit is eaten it much resembles the filbert both in shape and in flavour but has a thinner shell It is enclosed in a very prickly cup

			lbs
E 494	Dalka Jhar	Darjeeling Terai	43
E 681	Khookloong Forest		45
E 1254	Tezpur Assam		44

2 **C tribuloides,** Alph DC, Brandis 490 Gamble 79 *Castanea tribuloides,* Kurz ii 480 *Quercus ferox* and *Q armata,* Roxb Fl Ind iii 639, 640 Vern *Tumari, katonj,* Kumaun, *Musre katus, kotur, chisi, maku, shingali,* Nep, *Bar hingori kanta singai,* Ass *Dingsaot,* Khasia, *Singhara,* Tipperah, *Kanta lal batana,* Chittagong, *Kyansa,* Burm

An evergreen tree Wood grey, moderately hard Annual rings marked by darker lines Pores moderate sized and large, in long wavy radial lines and bands Medullary rays numerous, very fine, uniform and equidistant Numerous fine, wavy, concentric lines

and charcoal forests are required as they often are by planters

			lbs
E 626	Dulka Jhar	Darjeeling Terai	32
E 495	Khookloong Forest,		39

3 **C rufescens,** Hook f and Th, Gamble 79 Vern *Dalne katus,* Nep, *Sirikishu,* Lepcha, *Hingori,* Ass

A very large evergreen tree Wood grey, hard Annual rings marked by narrow belts of firmer texture Pores moderate sized and large, enclosed in soft tissue, arranged in irregular, radial bands and lines Medullary rays very fine, very numerous, uniform and equidistant, with numerous short, fine, transverse bars

woo
Qu
is n
this genus
cup with long needle like prickles longer than those of *C indica*

			lbs
F 354	Rangbul Forest Darjeeling 7 000 feet		47
E 2457	"		45

and *C. oliviformis*, Nuttall, the Pear nut. The wood of all is very strong and elastic, and is used for building, but is not durable (von Mueller).

Wood moderately hard, shining. Pores moderate-sized, uniformly distributed, prominent on a vertical section. Medullary rays fine or very fine.

1. JUGLANS, Linn.

The Black Walnut wood of America is given by *J. nigra*, Linn.; and the Butternut tree of Canada is *J. cinerea*, Linn.

1. J. regia, Linn.; Roxb. Fl. Ind. iii. 631; Brandis 497; Kurz ii. 490; Gamble 80. The Walnut. Vern. *Charmaghz*, Pers.; *Ughz, waghz*, Afg.; *Akhor, krot, dún*, Kashmir; *Kabotang, thanka*, Pb.; *Starga*, Ladak; *Ká*, Kunawar; *Akhor, kharot*, Kumaun; *Akhrot*, Hind.; *Akrút*, Beng.; *Kowal*, Lepcha; *Tagashing*, Bhutia.

A large tree with grey bark, characteristically marked by deep vertical parallel fissures, ½ inch to 2 inches thick. Heartwood greyish brown with darker streaks, often beautifully mottled, moderately hard, even-grained, seasons and polishes well. Annual rings marked by a sharp line. Pores moderate-sized, not very numerous, sometimes oval and subdivided, uniformly distributed, but somewhat more numerous in the spring wood. Medullary rays short, very fine. Numerous regular, fine, wavy, concentric lines. Pores visible on a longitudinal section.

Wild in the North-West and Sikkim Himalaya. Cultivated largely throughout the hills, especially in Afghanistan and Kashmir.

Growth variable; our specimens gave the following per inch of radius:—

H 9. 14 rings; H 15. 14 rings; H 125. 19 rings;
H 29. 3 rings; (young tree).
E 357. 9 rings; E 2441-a, 3 rings; b, 7 rings; E 2440, 4 rings.

So that the wood from the North-West Himalaya, omitting the specimen cut from a young tree, shews an average of 15 rings, and that from Sikkim an average of 6 rings per inch of radius.

Weight: European Walnut weighs 40 to 48 lbs. per cubic foot; our specimens give, North-West Himalaya 41 lbs., Sikkim 33 lbs. on an average. The tree reaches a very large size. Brandis describes trees up to 28 feet in girth and 100 feet high from the North-West Himalaya; in Sikkim it often reaches 100 to 120 feet in height with a girth of 12 feet or more. It is being grown in plantation at Rangbúl and other places near Darjeeling. The wood is extensively used for furniture throughout the Himalaya, and its principal use is for gun-stocks. In Darjeeling it is occasionally used for shingles by the Bhutias, but is not so good as chestnut. Before it became scarce in the forests it was largely used for house-fittings, and many of the older houses in Darjeeling have their doors and windows and other fittings almost entirely of Walnut. The bark is used as a dye and in medicine; and is exported to the plains for cleaning the teeth. The twigs and leaves are used for fodder. It is commonly cultivated for its fruit throughout the Himalaya; the wild tree has a thick shell and small kernel, and is rarely eaten; the cultivated trees are of numerous kinds, one of the best being the thin-shelled or *Kaghazi* variety. A clear, good description of oil is made from the fruit, and the rind is used for tanning and dyeing.

			lbs.
H	3163.	Dungagalli, Hazara, 7,000 feet	...
H	9.	Matiyana, Simla, 7,000 feet	38
H	29.	„ „ „ „	43
H	15.	Jubal, 4,000 feet	33
H	41.	Madhan, 6,000 feet	41
H	780.	Chamba, 4,000 feet	46
H	125.	Ralla, Kulu, 6,000 feet	42

		lbs.
H 428	Durani block Deoban Jaunsar, 6,000 feet	43
E 357	Tukdah Forest, Darjeeling, 5 000 feet	28
E 2440	Darjeeling 6 000 feet	37
E 2441	Rangirum Forest, Darjeeling, 5,000 feet	33

2 ENGELHARDTIA, Lesch

Three species though Brandis, p 500 thinks that the two described are probably varieties only of one and the same, *viz*, *E spicata* *E villosa* Kurz ii 491, is a tree of the *Eng* forests of Martaban and Tenasserim

1. E. Colebrookiana, Lindl , Brandis 499 Vern *Timar rakh*, Pb , *Mowa, gobar mowa, bodal moua, mao*, Kumaun , *Khusam*, Banda

A small deciduous tree Bark grey Wood grey with a reddish tinge, moderately hard, even-grained, seasons and polishes well, but is not durable Annual rings faintly marked Pores moderate sized and large, mostly oval and subdivided, uniformly distributed Medullary rays fine, uniform, equidistant, numerous Pores marked on a longitudinal section

Outer North West Himalaya ascending to 6 500 feet, often gregarious

Growth, our specimen shews 5 rings per inch of radius Weight 33 lbs per cubic foot

		lbs
H 241	Garhwal Hills (1868)	33

2. E spicata, Bl , Brandis 500, Gamble 81 *E Roxburghiana*, Lindl *Juglans pterococca*, Roxb Fl Ind iii 631 Vern *Silapoma*, Hind , *Mowa, mahua*, Nep , *Suiiak*, Lepcha , *Bolas*, Beng , *Rumgach*, Ass , *Bor patta jam*, Cachar , *Dinglaba*, Khasia , *Vakru*, Garo

A large, handsome, deciduous tree Character and structure of the wood similar to that of *E Colebrookiana*, shewing a beautiful grain on a radial section Faint concentric lines joining the pores.

Terai and outer hills of Eastern Himalaya up to 6 000 feet Chittagong and Burma

Growth fast 3 to 5 rings per inch of radius Weight Wallich gives 40 our specimens 33 lbs per cubic foot The wood is used in Sikkim for tea boxes and building, in the Khasia Hills and Cachar for planking and spoons It does not warp The tree coppices very freely, and coppice woods almost pure or mixed with oak and chestnut, are not uncommon near Darjeeling

	lbs
E 653	30
E 687	33
E 2412.	36

Order CI GNETACEÆ.

Two genera, *Gnetum* and *Ephedra*, the first containing 5 species, chiefly of the moist zones, the latter 2, of the arid zone and inner arid Himalaya

Gnetum scandens Roxb Fl Ind iii 518 Brandis 502 (*G edule* Bl , Kurz
oluw ty, Burm ,
Western Ghats
, Kurz ii 496
Vern *Gyootnway* Burm , is a large scandent shrub of Chittagong and Burma, *G neglectum* Bl , is a climber of Arracan and South Tenasser *G* ,

Linn.; Kurz ii. 497; Roxb. Fl. Ind. iii. 518, is an evergreen tree of the forests of south Tenasserim, whose bark is made into strong cords, and whose leaves are eaten as spinach.

The wood consists of a large number of distinct wedge-shaped ligneous masses which are arranged in concentric circles and separated by cellular tissue. It resembles the wood of Menispermaceæ. (Brandis.)

Ephedra vulgaris, Rich.; Brandis 501. Vern. *Asmánia, búdshúr, chewa*, Pb.; *Khanda, khanna*, Kunawar; *Tse, tsapatt, trano*, Ladak, is a small rigid shrub of the inner arid, North-West Himalaya, with a fibrous tough wood and red fruit, which is sometimes eaten. *E. Alte*, C. A. Meyer; Brandis 501. Vern. *Alte*, Arab.; *Kuchan, nikki kúrkan, bratta, tandala, laṣṭúk, mangarwal*, Pb., is a gregarious shrub of the arid zone, in stony places in the Punjab and Sind.

ORDER CII. CONIFERÆ.

An Order containing many very important forest trees. It is found throughout the world, but chiefly in temperate and cold regions; and in India, with few exceptions, the species are confined to the Himalaya. The following list which is taken from Parlatore's Monograph in DeCandolle's Prodromus, gives the five tribes and the most important genera, those found in India being given in italics; the others are added in consequence of their being universally planted for ornament or for timber:—

Tribe	I.—Araucarieæ	*Araucaria, Dammara.*
,,	II.—Abietineæ	*Pinus, Cedrus, Abies, Larix.*
,,	III.—Taxodieæ	*Cunninghamia, Sequoia, Cryptomeria, Taxodium.*
,,	IV.—Cupressineæ	*Callitris, Thuya, Biota, Cupressus, Juniperus.*
,,	V.—Taxineæ	*Dacrydium, Taxus, Ginkgo, Podocarpus.*

Araucaria contains about seven species, most of which have been introduced and cultivated in gardens in India. *A. imbricata*, Pavon (Brandis 503) from the mountains of Chili, is well known in Europe; it is much grown in England and is hardy, though sometimes liable to be injured by frost. *A. excelsa*, R. Br., from Norfolk Island, is much planted in Calcutta, where also may be seen *A. Cunninghamii*, Ait., of Queensland, *A. Cookii*, R. Br., of New Caledonia, and *A. Bidwilli*, Hook., the Bunya-Bunya Pine of North-East Australia. *Dammara australis*, Lamb, is the Kauri Pine of New Zealand, which, though much cut, still forms forest occasionally and gives a valuable timber. *D. alba*, Rumph, of the Moluccas, yields the resin called Dammar.

Cunninghamia sinensis, R. Br. is a large tree of Southern China. *Sequoia* contains two Californian species: *S. gigantea*, Torrey, the *Wellingtonia* or Mammoth Tree, which reaches over 300 feet in height, with a girth of 80 to 100 feet; and *S. sempervirens*, Endl., the Redwood, which reaches to 300 feet in height, with a girth of 55 feet (see Brandis 504). *Taxodium distichum*, Rich., is the Cypress of the swamps of the Southern States of North America.

Callitris quadrivalvis, Vent.; Brandis 535; Mathieu Fl. For. 453, is a large tree of the forests of Algeria. Of *Thuya* or Arbor Vitæ trees, three species occur in North America, giving a light, soft but durable, building timber. *Biota orientalis*, Endl. (Brandis 534) is the Arbor-Vitæ of China and Japan, occasionally cultivated in India.

Dacrydium contains several fine trees of Australia and New Zealand, and Kurz gives *D. elatum*, Wall., from Tenasserim, while *Ginkgo biloba*, Linn., with leaves like those of the Maiden Hair Fern, and thence commonly known by the name of *Salisburia adiantifolia*, is a deciduous tree of China and Japan, now much planted for ornament in Europe.

The wood of Coniferous trees is without vessels, hence, on a horizontal section, without pores. It consists of medullary rays and long wood

cells tapering at the ends, in the case of most species these wood cells are large and visible under the lens The annual rings are, as a rule, distinctly marked by a belt of thick-walled wood cells in the outer (autumn) wood and a belt of larger and thin-walled wood cells in the inner (spring) wood

In the case of the Juniper, Cypress, Yew and *Podocarpus*, the firmer belt of autumn wood is narrow, and the whole structure of the wood, therefore, is homogeneous On the other hand, in the case of the Pines, Firs, Cedar and Larch the wood consists of alternate layers of soft spring wood and firm autumn wood

The turpentine (resin) is secreted in large, branching, intercellular ducts, lined by thin-walled cells These cavities are called 'resinous ducts,' and they are of two classes, *vertical*, running with the wood cells parallel to the axis of the stem, and *horizontal* ducts, running with the medullary rays The horizontal ducts can, as a rule, only be seen under the microscope, they will therefore, not be generally noted in the following descriptions The vertical ducts appear on a cross section as scattered pores varying in size Resin is also found in parenchymatic cells with *straight ends, which are found mixed with ordinary wood cells* this is the case in Cypress

The timber is homogeneous in the case of Cupressineæ and Taxineæ, *but, as explained, in the case of* Abietineæ it consists of alternate layers of soft spring wood and hard autumn wood. The value of the timber of Abietineæ for building purposes depends in a great measure upon the greater or less proportion of the firmer belt of autumn wood and also upon the more or less spongy nature of the spring wood Under certain circumstances, for instance, the timber of Deodar has an extremely soft and spongy spring wood, and a comparatively narrow belt of autumn wood Such timber is probably less durable and not as strong as timber grown under other circumstances, which has a less spongy spring wood and a larger proportion of firm autumn
structure may be noticed in the case of . -
ous trees, and it is a *subject worth careful enquiry how far durability* and strength are effected by these characters, and to determine the conditions of growth under which the wood of coniferous trees exhibits the *varieties of structure* here adverted to It is *generally supposed that* slow-grown timber of coniferous trees is heavier and more durable than timber of the same species which had grown more rapidly This, however, is not always the case The following are instances of a light weight in the case of slow-grown timbers —

				lbs
Pinus excelsa	. .	H 110	(22 rings)	26
Cedrus Deodara		H 302	(31 "	32

Logs which contain much resin are heavier than those which contain little resin

With few exceptions the wood of coniferous trees was as well The woods are light, the weight per cubic foot ranging between 20 and 40 lbs, with few exceptions, such as Taxus, which weighs over 40 lbs

1 PINUS, Linn

Five Indian species, the whole genus working to Parlatore in

Prodromus (Subgenus I. *Pinus*) containing 66 species, and according to Gordon's 'Pinetum' 92 species. The European species are, many of them, very important:—

P. sylvestris, Linn. is the Scotch Fir, which gives the timber known as Red Memel, Dantzic Fir and Red Deal of the Baltic. *P. Pinaster*, Soland. (*P. maritima*, Lamk.) is the Maritime or Cluster Pine so largely used in reclothing sandy wastes on the sea-shore, like the 'Landes' of Gascony, and for the production of resin. *P. halepensis*, Mill., is the Aleppo Pine found throughout the Mediterranean region, chiefly on limestone. *P. Laricio*, Poiret, gives two varieties, called respectively the Corsican Pine and Austrian Pine, which are also used for the production of resin and for replanting barren soils. *P. Pinea*, Linn. is the Stone Pine of Italy, with edible fruits, and *P. Cembra*, Linn., the 'Arolle' of the mountains of Central Europe.

Of the American Pines the most important is the *P. Strobus*, Linn., the White Pine or Weymouth Pine, whose wood is extensively used in America and is exported to Europe from the forests of Canada.

The species indigenous in India may thus be recognized by the characters of their leaves and cones:—

Leaves in pairs . . . . *P. Merkusii.*
„ in threes
  Scales of cone beaked.
    Leaves long . . . . *P. longifolia.*
    „ short . . . . *P. Gerardiana.*
  Scales of cone obtuse . . . . . . *P. Kasya.*
Leaves in fives . . . . *P. excelsa.*

Wood generally very resinous, not homogeneous, consisting of alternate layers of soft and often spongy spring wood, and of hard and darker coloured autumn wood. Vertical resinous ducts large and numerous, in most species visible on horizontal and vertical sections. The Indian species have a distinct heartwood.

1. P. longifolia, Roxb. Fl. Ind. iii. 651; Brandis 506; Gamble 81. Vern. *Nakhtar*, Afg.; *Chíl, chír, dráb chir*, Pb.; *Gúla, thansa*, Kangra; *Anander*, Jhelam; *Saral*, Jaunsar; *Chír, salla, sapin, kolon, kolan, kolain*, Garhwal and Kumaun; *Dhúp*, Oudh; *Dhúp, sala dhúp, sula*, Nep.; *Gniet*, Lepcha; *Teadong*, Bhutia.

A large tree. Bark 1 to 2 inches thick, reddish brown, inner substance dark red, cut by deep fissures into large plates of irregular shape. The bark of the Sikkim tree is thinner and the plates smaller. Heartwood small, soft, reddish. Annual rings well marked, consisting of an inner belt of soft and spongy tissue, and an outer hard, compact and darker coloured belt, the inner soft belt generally occupying half to two-thirds or more of the ring. Medullary rays fine and extremely fine, numerous, prominent as narrow lines on a radial section. Vertical resinous ducts large and numerous, irregularly distributed, prominent on a vertical section.

Afghanistan, Outer North-West Himalaya ascending to 7,500 feet, Sikkim and Bhutan ascending to 4,000 feet, though scarce above 3,000 feet.

P. longifolia generally shows a moderate or slow rate of growth as far as our experience goes. Its growth, other circumstances being equal, is most rapid in the North-West Himalaya at elevations between 4,000 and 7,000 feet, less rapid at lower and higher elevations. On this subject, however, as well as on the rate of growth of *P. longifolia* generally, systematic observations are much wanted.

The rates of growth shown by our small specimens are, per inch of radius—

	rings.		rings.
H. 13	14	E. 704 (large round, 2 ft. diameter)	11·7
H. 93	5·6	E. 2435	23
H. 602	5·5	E. 2436 (planted tree about 20 years old.)	4·5
O. 3003	18		

which would seem to indicate that the growth in Sikkim is slower than in the North-West Himalaya From a paper by Mr Smythies in the Indian Forester, Vol VI.

grown trees at a tolerably high elevation such as that where H 93 and H 602 were cut The growth in height is undoubtedly fast at first, as the leading shoot often reaches 18 to 24 inches yearly, and the growth in diameter appears to be equally great in well grown trees

Regarding the weight and transverse strength of Chil the following experiments have been made —

Captain Jones at Almora in 1844—

	Weight	P =
15 experiments, unseasoned wood, 4 ft × 2 in. × 2 in,	gave 39 lbs,	626
5 " seasoned , "	" 27 "	555

Experiments at Roorkee in 1858 on Garhwal wood by Colonel Maclagan, R E

	Weight	P =
3 experiments, with bars 22 ft × 1 in × 1 in,	gave 27 lbs	906
4 " " " 34 " × 1 " × 1 "	" 27 "	961
4 " " " 34 " × 2 " × 1 "	" 27 "	916

Dr Warth's weighings of our specimens shewed that the weight varied from 37 to 45 lbs, averaging 41 lbs, the Sikkim wood being rather heavier, as well as darker coloured, and more filled with resin The wood is not durable, it is attacked by insects and decays rapidly when exposed to wet, it is however, easy to work and is extensively used in some localities in the hills for building, shingles, tea boxes and the bottoms of boats It gives large quantities of resin more than any of the other Himalayan Pines but the process is exhaustive Brandis says, "The yield of an ordinary tree is 10 to 20 lbs of resin the first, and about one third of the quantity the second year, after which the tree either dies or is blown down" Tar is also extracted from it, and turpentine is distilled from the tar The bark is used for ... nade into charcoal, and the

... up under shade, but the ... ilty if fire and cattle are excluded from the cuttings

			lbs
H	602	Tuttul Forest, Kangra	37
H	13	Simla, 6,000 feet	39
H	93,		39
O	3003		45
E	704		45
E	2435		42
E	2436		

2. **P. Kasya,** Royle, Brandis 508; Kurz ii. 499. Vern. *Dingsa,* Khasia, *Tinyu-ben,* Burm.

Bark thick, with deep cracks and fissures. Wood very resinous, heartwood red. Inner layer of annual ring soft and spongy, outer layer moderately hard. Resinous ducts moderate-sized, numerous in the outer and middle belt of each annual ring, very prominent on a vertical section.

... al mountains between

... vol i, p 202, 1829, the weight determined by Captain Baker, but ...

bars 15″ × 0·8″ × 0·9″ is given as 37 lbs. and the value of P. 522. The wood is extensively used in the Khasia Hills for building and other purposes. It is very rich in resin.

		lbs.
E 797.	Khasia Hills	38

3. P. Merkusii, Jungh.; Kurz ii. 499. Vern. *Tinyu-ben*, Burm.

A large tree with thick, rough bark. Heartwood yellowish brown with dark streaks, moderately hard, exceedingly resinous. Structure similar to that of *P. Kasya.*

Tropical forests of Burma on the Thoungyeen river, associated with *Dipterocarpus tuberculatus.*

Our specimen shews a moderate growth, 11 rings per inch of radius; its weight is 51 lbs. per cubic foot. Major Seaton gives 54 lbs. The wood is sometimes brought to Moulmein for mast pieces, but the difficulties of land and water transport are very great, almost preventing its extraction at a profit. Splinters are extensively used for torches.

		lbs.
B 547.	Thoungyeen, Burma	51

4. P. Gerardiana, Wall.; Brandis 508. Vern. *Chilghoza, jalghoza*, Afg.; *Chiri, prita, mirri, galboja, galgoja*, Chenab; *Kashti*, Ravi; *Ri, rhi*, Kunawar; *Kannuchi, koniúnchi, kaninchi, shangti*, W. Tibet; the seeds, *neoza.*

A moderate-sized tree, with very thin, smooth, grey bark, exfoliating in large thin scales, leaving shallow, rounded depressions; cracked only in very old trees. Heartwood yellowish-brown, hard, durable, very resinous. Resinous ducts scattered, similar in size to those of *P. excelsa*, prominent on a vertical section.

Inner dry and arid North-West Himalaya, found in isolated areas of no great extent, generally between 6,000 and 10,000 feet, mountains of North Afghanistan and Kafiristan.

Growth, specimen H 991 gives 24 rings, but appears to have been cut from a branch; H 1405, of old heartwood, gives 13 rings. Weight, 44 to 47 lbs. per cubic foot. The wood is rarely used, as the tree is valued for its edible seeds; it is, however, sometimes hollowed out for watercourses, and is used for the hook which attaches the seat to the rope in a single-rope swing-bridge.

The seeds are a staple article of food in Kunawar, and other parts of the Himalaya; they are largely brought into India from Afghanistan. They are oily, with a slight turpentine flavour, and are generally roasted and eaten at dessert.

		lbs.
H 991.	Kunawar, Punjab, 9,000 feet	44
H 1405.	Chenab, „ „ (Stewart, 1867.)	47

5. P. excelsa, Wall.; Brandis 510; Gamble 82. Vern. *Piuni*, Afg.; *Biár*, Hazara; *Chíl, chír, chíltu, chítu, chiú*, Kashmir to Jaunsar; *Chíla*, Garhwal; *Kail*, Beas, Sutlej; *Lím*, Chamba, Kunawar; *Yara, yúr, yiro*, Kashmir; *Shomshing, limshing*, Lahoul; *Raisalla, lamshing, byans*, Kumaun; *Tongschí*, Bhutan.

A large tree with greyish brown bark, cut into small, rather regular plates by shallow fissures ¼ inch thick. Heartwood distinct, red, moderately hard. Annual rings distinctly marked by a narrow outer belt or line of compact wood, inner belt not spongy. Medullary rays very fine and very numerous, prominent on a radial section. Vertical resinous ducts scattered, smaller than those of *P. longifolia*, very numerous and prominent on a vertical section.

Himalaya, between 6,000 and 10,000 feet, occasionally found as low as 5,000 feet

and as high as 12,500 feet from the Indus to Bhutan, extending into the inner and tract Mountains of Af„hanistan and South Macedonia

The wood is more durable than that of *P longifolia*, but less so than Deodar As f „ „ „ „ l nowledge goes at present the tree grows most rapidly up to a certain age at

	Rings.
H 901	6 7
H 1403α	7 8
H 27	8
H 923	9 5
H 1407	11
H 609	13
H 1404	14 5
H 140	22
H 1403β	27
E 2463	6 5

giving 22, 27 and 6 5 rings respectively, we have radius, but more information is much required port of 1877 the following measurements of Kail trees in Jangarkalaon and Deoban Reserves are given —

	Mean radius	Age	Rings per inch
No 1	10 5	49 years	4 7
„ 2	9 5	55 „	5 8
„ 3	10 75	65 „	6 0

from 26 to

of Chil or the Firs It is used for house building shingles, water channels, wooden spades and other implements It gives an excellent charcoal for iron smelting The wood is y extracted, as is that of bark is used to roof huts

ry good even on hill sides o prefer to grow on sandy

			lbs.
H	923	Hazara, (7 000 feet)	29
H	901	„ „	30
H	140	Lahoul (about 10 000 feet)	26
H	609	„ „ „ „	27
H	37	Mashobra, Simla, 7,000 feet	33
H	2871	Na„kanda, „ , 8,000 „	
H	1403α	Punjab Hills, Dr Stewart (1867	
H	1403β		32
H	1404		32
H	1407		33
E	2463	Chumbi Valley, Tibet, about 10,000 feet	28
			30

2 CEDRUS, Link

are

fro

spe

... see Brandis, page 321 A fourth variety has lately been discovered in Cyprus.

Statement showing the average age of 1st and 2nd class Deodars examined in the different Forests of Kunawur, and some of the adjoining Forests

Forest	No of trees examined.	Age of 1st class trees	Age of 2nd class trees	Diff	Remarks
		Years	Years		
1 Bhagarati { Exd by Dr Brandis	4	229	143	86	Forests with a slow rate of growth. Age of 1st class trees above 140 years. Age of 2nd class trees above 100 years
{ Exd by Mr A D Campbell	18	169	148	48	
—	13	214	158	56	
	3	189	142	47	
	2	177	133	44	
	7	160	119	41	
6 Swat River	10	156	112	44	
7 Phula Kiuden S	7	154	110	44	
8 Manda (Jangi) S	2	153	115	38	
9 Chini S	6	152	91	61	
10 Nachar S	30	149	112	37	
11 Poari Purbani, Akpa measured at Rupar S	9	145	106	39	
12 Kilba S	5	138	100	38	
13 Sleepers from Chenab at Lahore Rail	50	134	97	37	Forests with an average rate of growth. Age of 1st class trees between 110 and 140 years
.	4	134	93	41	
	4	132	98	34	
	4	130	96	34	
	7	130	91	39	
	3	125	80	45	
	39	124	88	36	
20 Rogi S	15	119	86	33	
21 Dippi S	2	117	88	29	
22 Yak Bursari S	3	116	87	29	
23 Topan and Kashang S	5	113	85	28	
24 Mebar S	7	113	83	30	
25 Chaog	5	110	87	23	Forests with a rapid rate of growth. Age of 1st class trees below 110 years. Age of 2nd class trees below 80 years
26 Simla (north side young trees)	23	99	73	26	
27 Jhelam	4	97	71	26	
28 Kadelli (between Matiyana and Nag kanda)	1	94	85	9	
29 Simla (south side)	9	91	67	24	
30 Kumkumee Shoang S	10	91	66	25	
31 Ravi timber good growth	4	91	62	29	
32 Kilba D ppi Kusthal (Rupar) S	8	90	66	24	
33 Janee S	3	80	56	24	
34 Yolinge (lower part of forests) S	2	76	57	19	
35 Jaunsar Bawur	17	71	53	18	
36 Simla (north side large trees)	7	71	52	19	
37 Taranda	4	67	49	18	
38 Chasoo Limsantang S	6	65	47	18	
39 Serinche (level ground) S	10	62	44	18	
40 Nagadar	8	50	34	16	
Total	380				

Note —The Sutlej Forests are marked S.

In 'Notes on Deodar Localities near Simla, 1867,' by Dr Brandis, the following measurements are recorded —

	No	Rings	Radius.	Rings per inch.
Dewra (Naldehra) Forest, altitude about 7,000 feet	1	86	11 in	,
	2	128	12 in	

29 years At this rate of growth they would reach 4½ feet in girth in 76 years, and 6 feet in 99 years

iagement of the Forests in The Danabial plantation 1866 were examined with

	No	Age	Girth (average)	Height	Rings per inch
		Years	Inches	Feet	
Planted in 1864	2	12	25 5	25 to 30	3
„ 1866	5	10	13 4	16 to 25	4 7

—a fast rate of growth

In the Kulu forests the following measurements were made —

	No	Mean radius Inches	No of rings	Rings per inch of radius
Alhobial Forest	1	5	60	12
	2	7	70	10
	3	10½	137	13
	4	6	85	14
		Average		12¼
Deoban Forest	1	6	35	5 8
	2	5	48	9 6
	3	5	26	5 2
	4	22 5	88	3 9
		Average		6 1
Sum Forest (poor soil)	1	8	65	8 1
	2	6 5	67	10 3
	3	9	67	7 4
	4	10·75	83	7 7
		Average		8 4
Betarjir (good soil)	1	14 75	94	6 4
	2	17 5	103	5 9
	3	23 75	99	4 2
		Average		5 5
Sandhar Forest 6 500 feet elevation, soil good, a succession of terraces, with steep slopes between	1	150	17 25	8 69
	2	100	14·00	7 14
	3	196	17 25	11 36
	4	175	20	8 75
	5	175	14	12 50
	6	120	13 50	8 88
	7	195	17	11 46
	8	175	25	7
	9	400	37 50	10 60
	10	175	18	9 72
	11	190	23 50	8·08
		Average		9 17

Phulga Forest, 7,000 feet, forest very fine, soil good, a succession of terraces. Rock granite.	1	135	24	5·62
	2	196	21·5	9·11
	3	215	21	10·24
	4	172	20·75	8·29
	5	249	26	9·58
	6	276	19	14·53
	7	200	20·75	9·64
	8	236	18·75	12·58
	9	230	23·75	9·68
	10	236	23·75	9·93
	11	269	21·75	12·36
	12	293	13	22·38
	13	190	25	7·60
	14	90	7	12·85
	15	166	18	9·22
	16	154	24	6·42
	17	190	50	3·80
	18	190	17	11·18
	19	196	20	9·80
	20	260	29	8·96
	21	259	25	10·36
	22	298	16	18·62
			Average .	10·53

The average result of the measurements of these 48 trees is 9·5 rings per inch of radius, shewing that in the forests of Kulu it may be expected that Deodar reaches $4\frac{1}{3}$ feet in girth at an age of 82, and 6 feet in girth at an age of 109 years, which is good growth for forests which must be looked on as in the second category.

In the just published 'Memorandum on the Forests of the Kuram Assigned Districts' by Mr. C. Bagshawe (Indian Forester, vol. vi., p. 28) a few measurements on sample areas of 2 acres each are recorded as follows:—

	No. of trees.	Mean radius.	Mean No. of rings.	No. per inch of radius.
Peiwar Forest—				
(1) S.-E. aspect, 8,600 feet . .	6	7·5 inches	191	25·5
(2) E. to N.-E. aspect, 8,500 feet .	20	9·4 „	191	20·3
(3) N.-W. aspect, 8,700 feet . .	7	10· „	223	22·3
(4) S. aspect, 8,660 feet . . .	5	12·2 „	148	14·5

The average of these measurements gives nearly 21 rings per inch of radius, equivalent to an age of 241 years corresponding to 6 feet in girth. This is entirely in accordance with Dr. Brandis' division of the Deodar forests, for such forests as those of Afghanistan will naturally come into the first category. We may, therefore, say that there is nothing to be obtained from measurements made since the publication of the 'Forest Flora of N.-W. and Central India' to alter materially the statement therein made that the average ages of 6-ft. girth trees are—

1st Division	above	140 years.
2nd Division	from 110 to 140	„
3rd Division	under	110 „

Girth and height at different ages.—The proportion between the height and girth naturally depends, to a very great extent, on the condition of the forest in which the trees are found; isolated trees will naturally increase in girth more than in height, while trees grown in dense forest will run up fast in height at the same time that the increase in girth is slow. The pole forests examined at Mahasu, whose measurements are given on page 402, shewed trees which varied in age from 15 to 35 years, in radius from 13 to 30 inches, and in height from 23 to 50 feet. When young Deodar grows slowly, Brandis says it attains 12 to 20 inches only during the first 3 to 4 years. But further information regarding the increase in height of Deodar at different ages is much wanted.

Crop of timber per acre.—Little information on this point has been collected since the publication of the 'Forest Flora of N.-W. and Central India,' where the subject is discussed at pp. 521-522.

The results of surveys given in the Bussahir Report are there quoted and here reproduced, they give—

No		Locality	Area surveyed Acres	Age of forest Yrs	Trees per acre	Crop per acre C ft
1	Jaunsar.	Mayshak Forest	0 69	70	54	2 464
2		Khattowa ,,	0 46	84	69	3 604
3		Chilara ,,	0 34	83	70	4 323
4	Kunawar	Kinden ,,	1 60	180	56	5,512
5		,, ,,	0 33	180	90	8 972
6		Nachar ,,	2 30	250	62	12 300

In para 21 of the Mahasu [illegible] n in that locality would be, at 80 y[illegible]

The valuations made in the [illegible] —

No	Acres	Under 4'6	4 6' to 6	above 6.	Total	Per acre
1	2	66	30	26	122	61
2	2	48	58	62	168	84
3	2	41	37	20	98	49
4	2	23	17	37	77	39 5
	Average	44 5	35 5	36 25	116 25	58 1
	Per acre	22 25	17 75	18 1	58 1	

Thus, the Jaunsar and Kunawar data would give, as far as the information we have goes, about the following —

	No of trees of 2 higher classes.	Cubic contents.
Forest 80 years old	64	3 464
,, 180 ,, ,,	73	7,242
,, 250 ,, ,,	62	12,300

while the Kuram countings give, for forests which lie between 180 and 250 years, in all probability, 36 trees of the two higher classes per acre.

With regard to the weight of Deodar and its transverse strength, the following experiments are available —

Experiment by whom made	Year	Wood whence procured.	No of experiments	Size of bar	Weight	Value of P
				Ft. In. In		
Col Maclagan, R.E.	1858	Punjab	1	2 × 1 × 1	23 05	554
,, ,,	,,	,,	4	3 × 1 × 1		580
,, ,,	,,		4	3 × 1 × 2		602
,, ,,	,,	Garhwal	1	2 × 1 × 1	24 65	630
,, ,,	,,	,,	3	3 × 1 × 1		637
,, ,,	,,	,,	4	3 × 1 × 2		5.0
Major Robertson and Captain Henderson.	1856	Punjab	10	various		538
Major Cunningham	1854	....	20	2 × 1 × 1	..	656
,, ,,	,,	.. ..	13	various	36 70	340
Captain W Jones	1844	Kumaun	10	..	28	443, unseasoned.
			10	......	40	500, seasoned.

Experiment by whom made.	Year.	Wood whence procured.	No. of experiments.	Size of bar.	Weight.	Value of P.
				Ft. In. In.		
Rai Kanhya Lal*	1876	Punjab, Ravi	4	12 × 6 × 4	38	331
"	"	Punjab, Ujh	4	"	35	304
"	"	Punjab, Chenab	4	"	33	316
"	"	Punjab, Sutlej	4	"	34	215
"	"	Punjab, Ravi	8	8 × 6 × 3	34	367
"	"	Punjab, Ujh	8	"	38	387
"	"	Punjab, Chenab	8	"	34	311
"	"	Punjab, Sutlej	8	"	33	315
Ganga Ram	"	Chamba	2	12 × 3 × 3	32	351
"	"	"	1	12 × 2·9 × 2·9	34	330
"	"	"	1	12 × 2·8 × 2·8	35	302
Dr. Warth	"	Punjab, different localities.	8	......	36·5	...

NOTE.—The Roorkee experiments gave a mean of 587 as the value of P. for Punjab timber, and 592 for Garhwal timber. It has since been proved that these values were too high, and the experiments of Rai Kanhya Lal, who operated on larger pieces give a mean of 334. The working value of P. as taken by the Department Public Works in the Punjab is now 300.

Deodar wood is extremely durable, being by far the most durable of the woods of the Himalayan Conifers. It is the chief timber of North-West India and is used for all purposes of construction, for railway sleepers, bridges, and even for furniture and shingles. An oil is obtained from the wood by destructive distillation; it is dark-coloured, thick, and resembles crude turpentine. It is used for anointing the inflated skins which are used for crossing rivers; and as a remedy for ulcers and eruptions for mange in horses and sore feet in cattle.

Rings per inch of radius.				lbs.
......	H	940.	Chenab Forests	34
34 rings.	H	902.	Siúl Valley, Chumba	32
23 "	H	900.	Ravi Forests	36
11 "	H	616.	Beas Forests (Kulu)	42
7·5 "	H	617.	Sutlej Forests (Bussahir)	31
18 "	H	16.	Cheog Forest, Simla, 7,000 feet	41
7 "	H	42.	Mahasu Forest, Simla, 8,000 feet	35
	H	3058.	" " " "	...
10 "	H	3096.	" " " "	42

3. ABIES, Tournef.

Three Indian species. The Spruce Fir of Europe is *A. excelsa*, DC.; Brandis 526, and is nearly allied to, and much resembles, the Himalayan *A. Smithiana*. The Silver Fir of Europe is *A. pectinata*, DC.; Brandis 528, which is similarly related to *A. Webbiana* of the Himalaya; while the Himalayan *A. dumosa* finds its counterpart in the Hemlock Spruce of Canada, *A. canadensis*, Michaux (Brandis 527). Nearly related to this last is the Douglas Spruce, *A. Douglasii*, Lindl., a tree which forms extensive forests in North-West America, attaining a height of 300 feet and more, and furnishing a valuable strong timber. It is extremely fast grown and has succeeded admirably in Great Britain. Many other species of *Abies* are in cultivation in Europe.

Wood generally not resinous (the resin being usually found in the bark), light-coloured, almost white, no heartwood, not homogeneous, consisting of alternate layers of soft spring wood and hard autumn wood. Vertical resinous ducts scanty.

Cones at the ends of branches, drooping or horizontal, scales persistent.
- Cones 4-6 inches long, leaves green . . . *A. Smithiana.*
- Cones 1 inch " " white beneath . *A. dumosa.*

Cones lateral erect, scales deciduous . . . . *A. Webbiana.*

* Experiments made at Lahore between May 10 and August 5, 1876 and published in Circular No. 44 of November 30, 1877 of the Government of the Punjab, Public Works Department.

1. A. Smithiana, Forbes; Brandis 525; Gamble 82. *A. Khutrow*, Loudon. The Himalayan Spruce. Vern. *Wesha, bajúr*, Afg.; *Kachal, lachan*, Hazara, Kashmir; *Rewari, ban lúdar, sangal, salla, sarei, láuli, roi, rág, ráo, bang re, krok*, Pb. Himalaya; *Tos*, Ravi, *Rau, raiang, re*, Sutlej, *Rai*, Jaunsar; *Kandre, re, rhái, ráo, khutrau; riálla, rágha, morinda, lail, kilu*, Garhwal, Kumaun; *Sehshing*, Bhutia.

A lofty tree, with rough greyish-brown bark, cut into small quadrangular plates by shallow furrows. Wood white, with a reddish or brown tinge, a little harder than that of *A. Webbiana*. The inner belt of annual rings soft and spongy. Vertical resinous-ducts scanty, visible on a vertical section. Medullary rays fine and extremely fine, very numerous, prominent on a radial section.

North-West Himalaya between 7,000 and 11,000 feet, Sikkim and Bhutan in the inner valleys between 7,800 and 10,000 feet, mountains of Afghanistan, Kafiristan and Gilgit.

Regarding the rate of growth of Spruce, very little information has yet been collected. In Mr. Ribbentrop's "Working Plan of the Kalatóp Forest, 1873," the measurement of 10 trees are given thus:—

No	Locality	Girth at base	Height	Age	No. of rings per inch
1	Bindrabán	68 inches	108 feet	125	11 6
2	"	69 "	104 "	112	10 2
3	Kalatóp	65 "	90 "	70	6 7
4	"	64 "	98 "	74	7 2
5	Jagrota	89 "	82 "	80	5 6
6	Near house	69 "	114 "	70	6 3
7	" "	90 "	— "	237	16 5
8	Damkund	102 "	142 "	310	19 1
9	"	87 "	125 "	202	14 6
10	"	90 "	125 "	183	12 8

giving an ... per inch of radius, and 125 years of age to a girth of 6 ...
Circle, 187 ...
Block, ga ...
shew a mean ...
is as far as the averages can be taken for all the trees counted, we have ...

Radius	0—2 inches	2—4 inches	4—6 inches.
Average number of rings	16 3	19 4	22 5
or, per inch	8 15	9 7	11·25

shewing that the growth in Deoban Forest seems to get slower as the tree gets older. The figures further shew that the following are the average ages for different girths:—

Girth	Radius	Age
18 inches	2 9 inches	20
36 "	5 7 "	39
54 "	8 6 "	63
7?	11 2 "	91

... is slightly heavier than the ...
... o and
... rming,
... ark is
... twigs
... much

shade, and it generally makes very quick growth the first year, yearly shoots 18 to 24 inches being not uncommon.

			lbs.
H	3165.	Dungagalli, Hazara, 7,000 feet	...
H	775.	Kalatóp Forest, Dalhousie, 7,000 feet	31
H	3.	Mahasu Forest, Simla, 8,000 feet	28
H	12.	" " " " "	32
H	43.	" " " " "	32
H	2898.	Nagkanda, Simla, 9,000 feet	...
H	3032.	Hattu Forest, Simla, 9,000 feet (young tree)	39
H	420.	Mohna Block, Deoban Forest, 8,000 feet	26

E 965 sent by Dr. Schlich from the Chumbi Valley, Tibet, between Sikkim and Bhutan, from about 9,000 to 10,000 feet, is a species of *Abies* closely allied to *A. Smithiana*, but with shorter needles and smaller cones. It is probably undescribed. The structure of the wood is identical with that of *A. Smithiana*.

2. **A. dumosa,** Loudon; Brandis 527; Gamble 83. *Pinus Brunoniana*, Wall. The Indian Hemlock Spruce. Vern. *Changathasi dhúp, thingia, thingáni súla*, Nep.; *Tangshing*, Bhutia; *Semadung, chemdang*, Lepcha.

A large tree, with thick, rough bark. Wood white, soft, with a slight pinkish tinge. Resinous ducts scanty.

North-East Kumaun, Nepal, Sikkim between 8,000 and 10,500 feet.

Growth, our specimens shew the following:— E 377, 17·5 rings; E 968, 11·5 rings, average 14·5 rings per inch of radius. Weight, 27 to 29 lbs. per cubic foot. The wood is used in Sikkim for shingles. The bark is also used for roofing.

			lbs.
E	377.	Phallaloong ridge, Darjeeling, 10,000 feet	27
E	968.	Chumbi Valley, Tibet, about 10,000 feet	29

3. **A. Webbiana,** Lindl.; Brandis 528; Gamble 82. *A. Pindrow*, Royle. The Himalayan Silver Fir. Vern. *Palúdar, rewari*, Jhelam; *Bádar, búdar, túng*, Kashmir; *Dhúnu, rág, rail, pe, re, salle, sara*, Chamba; *Tos*, Kulu; *Spun, pun, krok, kalrei*, Kunawar; *Bharda; thanera*, Shali; *Burla, pindrau, pindrai*, Hattu; *Kúdrom*, Matiyana; *Burúl, búrra, búldu*, Bhajji; *Kalrai, satrai, chúr*, Kotkai; *Raho, row, chilrow, kilaunta*, Chor; *Morinda*, Jaunsar; *Ragha, rao ragha, ransla, raisalla*, Kumaun; *Wúman*, Byans; *Gobria sulah*, Nep.; *Dumshing*, Bhutia.

A lofty evergreen tree. Bark smooth, silvery on young stems, on old stems brown, cut into long, narrow scales by anastomosing spiral clefts, rough, ¼ inch thick. Wood white, soft. The inner zone of each annual ring is soft and spongy. Medullary rays very fine and exceedingly fine, very numerous, not prominent on a vertical section. Vertical resinous ducts very rare.

Himalaya, from the Indus to Bhutan; in the North-West Himalaya between 7,000 and 13,000 feet; in the inner ranges of Sikkim and Bhutan, between 9,000 and 13,000 feet; in the outer ranges it does not descend below 10,000 feet.

Not much more information is available regarding the rate of growth of Silver Fir than there is that of Spruce. The Kalatóp Working Plan and Deoban Report again afford most of the information. The measurements of 10 trees in Kalatóp are given thus:—

No.	Locality.	Girth at base.	Height.	Age.	No. of rings per inch.
1.	Bindrabán	78 inches	110 feet	170	13·7
2.	"	56 "	106 "	170	19·1
3.	Kalatóp	67 "	97 "	85	7·9
4.	"	67 "	93 "	72	6·7

No	Locality	Girth at base	Height.	Age	No of rings per inch
5	Jagrota	72 inches	90 inches	73	6 4
6.	„	55⅔ „	90 „	73	8 3
7.	Dainkúnd	82 „	120 „	248	19 0
8	„	77 „	103 „	192	15 7
9	„	72 „	120 „	195	17 0
10.	„	80 „	108 „	223	17 5

as follows —

Radius	0—2 inches	2—6 inches	4—6 inches.
Average number of rings	16 7	19 2	17 3
or, per inch	8 35	9 6	8 6

or a tolerably uniform rate of growth The Kanjatra figures further shew that the following are the average ages for different girths —

Girth	Radius	Age.
18 inches	2 9 inches	25
36 „	5 7 „	50
34 „	8 6 „	81
72 „	11 5 „	113

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a bark is
used for roofing shepherds' huts, in Sikkim it is used for troughs for the salt which is given to sheep grazing on the higher hills On the Jhelam the twigs and leaves are cut and stored for winter use as fodder and litter for cattle

			lbs.
H	934	Hazara, 7,000 feet	29
H	774.	Kalatóp Forest, Dalhousie, 7,500 feet	
H	2895	Hattu, Simla, 9,000 feet	
H	3031	Hattu, Simla, 9,000 feet	
H	65	Naghanda, Simla, 9,000 feet	29
H	421	Thona Block, Deoban Forest, 8,000 feet	30
E	359	Sandukpho, Darjeeling, 11,500 feet	27
E	2137.	„ „ „	..
E	964.	Chumbi Valley, Tibet, 10,000 feet	29

4. LARIX, Tournef.

and Altai mountains

Wood resinous, with a distinct red heartwood, not homogeneous, consisting of alternate layers of soft spring wood, and hard autumn wood. Large vertical resinous ducts.

1. L. Griffithii, Hook. f. and Th.; Brandis 531; Gamble 83. Vern. *Bourgasella*, Nep.; *Sah, saar*, Sikkim.

A deciduous tree, with reddish brown bark, ½ inch thick. Heartwood red. Inner zone of each annual ring soft and spongy, outer zone narrower, firm and shining. Resinous ducts scanty, large. Medullary rays fine and extremely fine, numerous, prominent on a radial section.

Nepal, Sikkim and Bhutan, between 8,000 and 12,000 feet.

Growth, our specimen shews 21 rings per inch of radius; its weight is 32 lbs. per cubic foot. The wood is considered durable, and is exported from Sikkim into Tibet. Hooker in Himalayan Journals, ii, p. 44, says that he never saw the wood to be red but always white and soft. Our specimen, however, is red and closely resembles the wood of the European Larch.

		lbs.
E 969.	Chumbi Valley, Tibet, about 10,000 feet	32

5. CUPRESSUS, Linn.

One indigenous Indian species, three others generally cultivated. *C. glauca*, Lam. Brandis 534, is cultivated in gardens in Western India above Ghát.

Wood homogeneous, fragrant, the firm belt of autumn wood very narrow. Resin is found in parenchymatic cells with horizontal ends.

1. C. torulosa, Don; Brandis 533. The Himalayan Cypress. Vern. *Devi-diár*, Ravi; *Deodar*, Kulu, Bhajji; *Gulla, gulrai, kallain*, Simla; *Leauri*, Jaunsar; *Raisalla, sarai*, Kumaun; *Sarrú, súrah-vyu*, Tibet.

A large tree. Bark ½ inch thick, brown, the outer layer peeling off in numerous long, narrow, thin strips, inner substance reddish brown. Heartwood light brown with darker streaks, very fragrant, moderately hard. Annual rings distinctly marked by a narrow, firm and dark coloured belt on the inner edge. Numerous intermediate, deceptive but not continuous, rings. Medullary rays very fine and extremely fine, very numerous. No vertical resinous ducts similar to those in pines; the resin is here contained in parenchymatic wood cells similar to those which form the tissue of the wood.

Outer ranges of North-West Himalaya, from Chamba to Nepal, scattered and in numerous isolated localities of greater or less extent, chiefly on limestone, between 5,500 and 9,000 feet.

Growth slow. Stewart records twelve to eighteen rings per inch of radius; our specimens shew: H 613 nine rings, H 61 thirteen rings and H 771 fourteen rings per inch of radius. The average weight of our specimens is 39 lbs. per cubic foot. The wood has been much used at Naini Tál for building, and is sometimes used for beams on the Ravi and Sutlej. In Kulu it is made into images, and is used for the poles which carry the sacred ark. It is often burnt as incense in temples.

		lbs.
H 30.	Tika, Simla, 8,000 feet	34
H 61.	Kandru, Simla, 8,000 feet	42
H 771.	Belj, near Bassú, Chamba, 7,000 feet	36
H 613.	Kulu, 7,000 feet	44

2. C. funebris, Endl.; Brandis 534; Gamble 83. Vern. *Chandang, tchenden*, Bhutia.

A handsome tree with pendulous branches, and a fibrous brown bark, often planted in Nepal, Sikkim and Bhutan near temples and monasteries, and in China. Structure similar to that of *C. torulosa*.

		lbs.
E 972.	Darjeeling Hills, about 5,500 feet	34

3. C. sempervirens, Linn., Brandis 533. Vern *Sara, sárás,* North-West India

A tall tree. Bark thin, light brown, fibrous, peeling off in thin strips. Wood light brown, moderately hard to hard. Annual rings distinctly marked by the dark, narrow, firm belt of autumn wood. Medullary rays fine, brown, very numerous. Resin-cells as in C. *torulosa.*

Cultivated in gardens in Afghanistan and North-West India, sometimes reaching 6 to 9 feet in girth, with 70 to 100 feet in height

		lbs.
O 3267.	Saharanpur Gardens	37

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raised in boxes or sheltered beds

Bark brown, fibrous, peeling off in narrow strips Wood soft, very uniform, with narrow bands of darker and firmer tissue at the edge of each annual ring. Medullary rays short, fine and very fine, extremely numerous.

6. JUNIPERUS, Linn.

Four Indian species Among exotic junipers the most important are *J virginiana,* Linn, of the Atlantic coast of North America, and *J bermudiana,* Linn, of the Bermudas, West Indies and Florida, which species mainly yields the wood of which pencils are made *J. drupacea,* Labill, Brandis 539, is a diœcious shrub with edible fruit, found in the mountains of Asia Minor and Syria, and cultivated in England.

Wood homogeneous, fragrant, generally of slow growth, the ring of firmer wood at the outside of each annual ring very narrow.

1. J. communis, Linn, Brandis 535. The Juniper. Vern. *Núch, páma, pethra, bentha, betar,* Kashmir, Chamba and Kulu; *Lang shúr, thelu, lewar,* Kunawar; *Chúni, shúpa,* Piti, *Sbama,* Lahoul; *Chichia,* Kumaun.

A large shrub, with thin, reddish brown, fibrous bark. Wood white, moderately hard, fragrant, with a small mass of darker wood near the centre. Wood cells large, visible under the lens. Medullary rays very fine, somewhat unequal in width.

fruit is sweet, aromatic and resinous, it is sold in the bazars of North India as a medicine (*abhul, huber*) and is administered in decoctions as a stimulant and diuretic. In Europe the berries are used to flavour gin.

H 137 Lahoul, about 10,000 feet
H 207 Upper Chenab

This specimen shews cracks in the wood, which are filled with a white substance, probably carbonate of lime or magnesia. It turns an orange colour with dilute sulphuric acid.

		lbs.
E 796.	Khasia Hills, 5,000 feet	45

This last has been identified by specimens to be undoubtedly *Taxus baccata.* The structure is identical with that of our other specimens, but the colour of the heartwood is not red like the rest of the specimens, but brownish white.

8. PODOCARPUS, L'Hér.

Three species. *P. neriifolia,* Don; Brandis 541; Gamble 83. Vern. *Gúnsi,* Nep.; *Dingsableh,* Khasia, referred by Kurz to *P. bracteata,* Bl., but kept separate by Parlatore, is an evergreen tree of Nepal, Sikkim and the Khasia Hills, up to 3,000 feet. The wood is considered to be superior and is held sacred in the Khasia Hills.

Wood homogeneous. Wood cells large, easily visible under the lens. Annual rings generally indistinct. No vertical resinous ducts. Wood very durable, not resinous.

1. P. bracteata, Bl. *Nageia bracteata,* Kurz ii. 500. Vern. *Jinari,* Cachar; *Thitmin* (Prince of Woods), Burm.; *Welimadá,* And.

A large evergreen tree. Bark grey-brown, thin, fibrous, peeling off in narrow flakes. Wood grey, moderately hard, of very uniform grain and texture throughout. The annual rings are faintly marked by darker lines, but the texture of the different belts of one ring is uniform. Medullary rays extremely fine, closely packed. No vertical resinous ducts.

Khasia Hills, Burma, and the Andaman Islands.

Growth slow, our specimens average 15 rings per inch of radius. Weight, according to Brandis (*P. neriifolia, Thitmin,* No. 94 of Burma List of 1862), 50 lbs. per cubic foot, according to Bennett 34 lbs., our specimens give an average of 39 lbs. Bennett gives P = 588. The wood is used for oars, masts of boats, and for planking It is greatly esteemed by the Burmese. Dr. Mason says, "It is used by carpenters for various purposes, and the Burmese have a superstition that the beams of balances should be made of it." Major Berdmore says it is used to avert evil by driving a peg of it into a house-post or boat.

		lbs.
E 1277.	Cachar	38
B 508.	Andaman Islands	37
B 2265.	„ „ (Major Ford, 1866)	39
B 2556.	„ „ (Home, 1874, No. 10)	41

2. P. latifolia, Wall.; Beddome t. 257. *Nageia latifolia,* Kurz ii. 500. Vern. *Soplong,* Khasia; *Nirambali,* Tinnevelly; *Thitmin,* Burm.

A large evergreen tree, with grey aromatic-wood, and structure similar to that of *P. bracteata.*

Tropical forests of Martaban and Tenasserim Hills; Hills of Tinnevelly, at 3,000 to 5,000 feet (Beddome); Khasia Hills and Eastern Bengal (Parlatore).

Weight, our specimen gives 33 lbs. The wood is used for similar purposes to that of *P. bracteata.*

		lbs.
B 569.	Tonghoo, Burma	33

E 3414 from a planted tree at Darjeeling is *Biota orientalis,* Endl. Bark thin, brown, peeling off in papery flakes, and with numerous resin-cells. Wood moderately hard, close-grained; heartwood dark reddish-brown, the annual rings marked by darker colour. Medullary rays numerous, fine, very short.

ORDER CIII. CYCADACEÆ

Beddome

One genus, *Cycas*, including four . . . *Mongtain*, ccxxvii, Kurz ii. 502 (*C circinalis*, branched Burm, is an evergreen palm like tree . and often trunk, found in the coast forests of South ... cultivated in South India The wood yields a quantity of sago or starch, and the stem exudes a resin which is used to cure ulcers *C circinalis*, Linn, Beddome ccxxvii (*C. sphærica*, Roxb Fl Ind iii 747) Vern *Orasmaro*, Cuttack, is found in South India and Ceylon The seeds are ground into flour and used for food in time of scarcity *C. siamensis*, Mid, Kurz ii. 503, is a low stemless, palm like tree, common in the *Eng* and dry forests of Prome, and yielding a whitish gum

1. C. pectinata, Griff.; Kurz ii. 503; Gamble 84. Vern. *Thakal*, Nep.

An evergreen, simple-stemmed, palm-like tree. Bark in horizontal folds, with diagonal clefts, making diamond-shaped bosses. Wood yellowish white, in narrow wedge-shaped plates, arranged in nearly concentric rings and separated by white tissue, which, like the central pith is full of starchy granules

in Sikkim. prove to be

There is some ... new.

		lbs
E 2439	Chenga Forest, Darjeeling, 1,000 feet	54
E 877	Balasun Forest, Darjeeling Terai	—

II. MONOCOTYLEDONS.

ORDER CIV. ZINGIBERACEÆ.

...enalæ ... ntains, ... ardens ... many ... plant

(...

ORDER CV. PALMÆ.

... trees, shrubs or climbers, found almost all ... the most arid zones and containing many of the

...

Tribe	I.—Borassineæ	*Borassus*
„	II.—Corypbineæ	*Corypha, Chamærops, Livistona, Licuala.*
„	III.—Phœnicineæ	*Phœnix*
„	IV.—Arecineæ	*Wallichia, Caryota, Areca, Bentinckia, Arenga.*
„	V.—Cocoineæ	*Cocos.*
„	VI.—Lepidocaryineæ	*Calamus, Plectocomia, Korthalsia, Zalacca.*
„	VII.—Nipineæ	*Nipa.*

Besides these, several species from other countries are to be seen, cultivated, in India. The magnificent *Oreodoxa regia* from Brazil may be seen in Calcutta, where avenues of it have been planted in the Botanic Gardens, and isolated plants in the gardens of many houses.

The wood and bark are not distinct, but the stem generally consists of an inner softer, and an outer harder portion. The stem consists of a large number of scattered fibro-vascular bundles, embedded in soft cellular tissue. On a horizontal section the vascular bundles appear most numerous near the circumference of the stem; here they are small, very hard, and often nearly confluent, so as to form a hard rind. In the centre of the stem, the bundles are less numerous and generally not so hard as near the circumference. Consequently, the central portion of the stem is chiefly composed of cellular tissue which often decays, so that the centre of old palms is frequently hollow.

On a vertical section the fibro-vascular bundles appear like long wavy lines, which do not run parallel to each other. On a radial section the vascular bundles cross each other, and they can be traced from the base of the leaf, where they terminate, bending inwards to the centre of the stem and then outwards again towards the circumference.

The structure of each bundle is different in its upper and lower parts. In its upper part it contains *firstly*, vessels varying in size, which on a horizontal section appear as pores; *secondly*, elongated or polygonous cells, generally forming a mass of softer tissue immediately surrounding the vessels; *thirdly*, a mass of long, thick-walled fibres, of which the hard horny portion of the bundle is composed. In the lower part, the bundle is composed almost entirely of fibres without any vessels or cells.

A horizontal section shews the bundles near the circumference in their lower part; these therefore only consist of fibre, while towards the centre the upper part of the bundles is cut through and shews fibres, vessels and cells. It must not be forgotten that on a cross section the upper portion of the bundles is cut through near the circumference where they enter the leaf stalk, but these are cut through obliquely, are easily recognised, and there are few of them.

1. BORASSUS, Linn.

1. B. flabelliformis, Linn.; Roxb. Fl. Ind. iii. 790; Brandis 544; Kurz ii. 529. The Palmyra Tree. Vern. *Tál, tála, tár*, Hind.; *Tál*, Beng.; *Potu tádi* ♀, *penti tádi*, ♀ Tel.; *Panam, pannie*, Tam.; *Pana* Mal.; *Tali, talé*, Kan.; *Tad*, Guz.; *Tál*, Cingh.; *Htan*, Burm.

A large tree with tall cylindric stem, surmounted by a terminal crown of fan-shaped leaves. The young stems are covered with dry leaves or the lower part of petioles, while the old stems are marked with the hard, black, long and narrow scars of the fallen petioles.

Centre soft, but not often hollow. Fibro-vascular bundles black, crowded in the outer portion of the stem; if cut through at right angles they are oblong, generally with one large pore and a mass of cells at one end. Outer wood hard, heavy, and durable.

Cultivated throughout tropical India and beyond the tropics in Bengal; and the southern part of the North-Western Provinces.

The following experiments have been made on the weight and transverse strength of the timber —

		Weight.	Value of P
A Mendis Ceylon No 83 bars 2 × 1 × 1″	found	65 lbs	811
Skinner Madras No 30 1862		65	344
Warth in 1878 No W 2922		63	
Salem No 15		72	

The weights of
the only ones con
spec mens gives 49
ta n ng partly outside partly inside wood The hollowed out stems are used as water pipes and split in half for gutters and open water channels The hard outer wood is used for posts rafters and other purposes. The leaves are used for th tel ats and basket work and for writing on The pulp of the fruit is eaten and in Ceylon is made into a preserve Seemann says that the Dutch when they had posses sion of Ceylon considered the preserved pulp or *Punatoo* such a dainty that large quantities of it preserved in sugar were exported to Holland and Java. The chief product however of the Palmyra Tree is the sweet sap which runs from the peduncles cut before flowering and collected in bamboo tubes or earthen pots tied to the cut peduncle *Brandis* Seemann says that in Ceylon the spathes are tied up from end to end with thongs and then beaten and crushed between wooden battens for three successive mornings that on each of the following four a thin slice is cut from the points of the spathes while on the eighth day the sweet clear sap begins to exude and is caught in earthen pots or bamboos The sap is fermented into toddy is distilled or is made into sugar known as jaggery The tree generally reaches 40 to 60 and occasionally 100 feet high and often measures 18 to 24 inches in diameter above the usually thick base

			lbs.
C	960	Guzerat Bombay	42
E	418	Jessore Bengal	46
W	767	South Kanara	51
W	863		
W	2922	Malabar	63
D	1475	Salem Madras	25
B	563	Prome Burma	49
B	2458	Myanoung Burma	31
No	15	Salem Collection	72
No	83	Ceylon Collection	65

2 CORYPHA, Linn

Five species *C Taliera* Roxb Fl Ind ii. 174 Brandis 549 Vern *Tara talier*
tarit
549
spiral
so all
Doida
side of

1 C umbraculifera, Linn , Roxb Fl Ind ii 177, Brandis 549, Kurz ii 524 The Talipat Palm Vern *Codapana*, Tam , *Bine*, Kan , *Tala*, Cingh , *Pe beng*, Burm

A tall tree, with terminal flowers which dies after seeding Wood soft, with a hard rind composed of black vascular bundles The vascular bundles in the centre of the stem are soft

give

Ceylon, measured: height of stem 84 feet, of flower panicle 21 feet, total 105 feet; girth at 3 feet from the ground round the persistent bases of the leaves 13 feet 9 inches, at 21 feet from the ground 8 feet 3 inches; age about 40 years. The leaves are very large, often 10 feet in diameter; they are made into fans, mats and umbrellas, and are used for writing on, as also are those of *C. Taliera.* A kind of sago is yielded by the pith.

W 867. South Kanara.

Kurz joins *C. Taliera* with this and *C. elata* with *C. Gebanga.*

3. CHAMÆROPS, Linn.

Of *Chamærops,* two or three species occur in India. *C. Martiana,* Wall. Brandis 546. Vern. *Jhaugra, jhaggar, tal,* Kumaun; *Taggu,* Nep., is a tall handsome palm, found on the Thakil mountain in East Kumaun, at from 6.500 to 7,800 feet elevation, in damp, shady glens, with a north-west aspect. It is also found in one or two minor localities in Kumaun and in Nepal, and is, besides, considered to be probably the same as *C. khasyana,* Griff.; Kurz i. 527. Vern. *Pakha,* found in the Khasia Hills and on the hills of Martaban at 4,000 to 6,500 feet. The writer has once found small plants of what is probably this palm on Rissoom, near Dumsong, beyond Darjeeling, at 6,500 feet elevation. *C. Ritchieana,* Griff.; Brandis 547. Vern. *Mazri, nozarái,* Trans-Indus; *Kilu, kaliún,* Salt Range; *Pfis, pesh, pease, pharra,* Sind, Beluch., is a generally stemless, gregarious shrub, peculiar to the arid zone of Sind, Trans-Indus, the Punjab, Afghanistan and Beluchistan. Its leaves are used to make matting, fans, sandals, baskets, hats and other articles; its leaves and leafstalks give a fibre which is made into ropes, and its seeds are pierced and made into rosaries, and for sale for that purpose are exported from the Beluchi port of Gwadur to Mecca. (A beautiful collection of the products of this palm [P 1779] was sent to the Paris Exhibition of 1878 from the Punjab, chiefly from the Salt Range.)

4. LIVISTONA. R. Br.

Livistona Jenkinsiana, Griff.; Gamble 86. Vern. *Talainyom, tulac-myom, purbong,* Lepcha; *Toko pat,* Ass., is an extremely handsome fan-leaved palm found in the forests of the Sivoke Hills in Sikkim and eastwards to Assam, where it is commonest in Nowgong and the Naga Hills. The leaves are largely used by Lepchas for thatching and for umbrellas, in Assam for the roofs of huts, boats and doolies, and for the large Naga-hats (often 3 to 4 feet in diameter, and called *jhapies*), and umbrellas (Nos. E 1728 to 1731, Assam). The tree reaches 30 feet in height, the wood is very soft, with white fibro-vascular bundles (No. E 2461, Sivoke Hills, Darjeeling). *L. speciosa,* Kurz, Journal As. Soc. Beng., xliii. ii., p. 204; For. Fl. ii. 526. Vern. *Thalu,* Magh; *Tau-htam,* Burm., is an evergreen, lofty palm of the forests of Chittagong the Pegu Yoma and Upper Tenasserim. Its leaves are sometimes used for thatching in Chittagong, instead of those of *Licuala.*

5. LICUALA, Rumph.

Licuala contains three Indian species. *L. paludosa,* Griff.; Kurz ii. 528, is an evergreen, gregarious palm of the tidal swamps of the Andamans. *L. peltata,* Roxb. Fl. Ind. ii. 179; Kurz ii. 527. Vern. *Patti, chattah-pat,* Ass.; *Kurud, kurkuti,* Beng.; *Sa-lu,* Burm., *Kápadah,* And. is a peltate-leaved palm of the forests of Assam, Eastern Bengal, Chittagong, Burma and the Andamans, said to extend westward as far as Sikkim. It is used in Assam for umbrellas, and in the Andamans for thatching (B 1046, Andamans). In Chittagong it forms a great part of the undergowth in some of the forests, notably the Kasalong Reserve, and its leaves, under the name of *Kuruchhpat* are universally used in the inner Hill Tracts for thatching, and when grass is scarce are largely exported to the plains. The stems are about 9 to 12 inches in girth, and 5 to 15 feet high; the wood is rather soft, and the vascular bundles evenly distributed, and dark coloured (E 3366 Kasalong Reserve, Chittagong). *L. longipes,* Griff.; Kurz ii. 528, is found in Mergui. The well-known walking sticks called 'Penang Lawyers' are the young trunks of *L. acutifida,* Mart., a very small palm of the Malay Peninsula.

6 PHŒNIX, Linn

Six to seven Indian species *P dactylifera*, Linn, Roxb Fl Ind iii 786, *Brandis 552* Vern *Khajur, khaji*, is the *Date Palm* cultivated and self sown in Sind and the Southern Punjab, and producing the well known fruit *P acaulis*, Roxb *Fl Ind iii 783, Brandis 555, Kurz ii 535, Gamble 86* Vern *Khajuri, pind khajur, jangli khajur*, Hind, *Schap*, Lepcha, *Boichind*, Mar, *Chindi, hindi*, ... Gond ... Kurku ... *hinboung* Burm, is a low palm with a thick, ... the Jumna east- ... It chiefly grows ... ruit is eaten by ... in Chota Nagpur ... *P Ouseleyana* ... *tata* from the Nilgiris *P fari-* ... Vern *Chilta eita*, Tel, *Ichal*, ... near the sea at Coringa, whose

logs, ...
Gamble 86 ...
and Bhutan, ...
the stem is often eaten by Lepchas

1. P. sylvestris, Roxb. Fl. Ind iii. 787; Brandis 554, Kurz ii 535 The Wild Date Palm Vern *Khajúr, khaji, salma, thalma, thakil*, Hind., *Pedda eita*, Tel, *Peria eetcham*, Tam, *Ichal, kullu*, Kan, *Seindi*; Berar, *Boichand*, Mar, *Sindi*, Gondi

A tree with ashy grey foliage, 30 to 40 feet high Stem rough, with the prominent scars of fallen petioles Wood light brown, the outer portion hard and durable Vascular bundles less numerous than in *Borasssus*, brown, horny, on a horizontal section circular or slightly oval, the fibrous portion uniform, enclosing the cells and vessels.

Wild and cultivated throughout India

The following experiments have been made to determine the weight and transverse strength of the wood —

	Weight	P =
Skinner in Madras, No 104, found	39 lbs	512
Warth in 1878 found our specimen give	45 „	

... ater tubes and other purposes, the leav... ut the chief produce of the tree is the sweet sap which is collected ... cutting a notch in the tree at the base of the lower leaves, the sap then flows for some time, and a thin slice is daily cut off the surface of the wound A tree is usually fit to tap at 10 years old and remains yielding for about 20 years. The juice is either fermented or boiled down into sugar

		lbs
E 416.	Sundarbans	45
P 887	Multan	

7. WALLICHIA, Roxb.

Contains 4 or 5 Indian species *W densiflora*, Martius, Brandis 549, Kurz, ii. 532, Gamble 84 (*Harina oblongifolia*, Griff) Vern *Kala aunsa, jur aunsa*

Kumaun; *Ooh,* Lepcha; *Takosu,* Nep.; *Zanoung,* Burm., is a small stemless palm, common in the outer Himalaya, from Kumaun eastwards, up to 4,000 feet, and in Eastern Bengal and Chittagong. In Kumaun the leaves are used for thatch and in Darjeeling for fodder for ponies. *W. caryotoides,* Roxb.; Brandis 550; Kurz ii. 532 (*Wrightea caryotoides,* Roxb. Fl. Ind. iii. 621) Vern. *Chilpatta, belpatta,* Chittagong; *Mochooma,* Magh; *Zanoung,* Burm., is a small palm of Chittagong and Burma. (Kurz refers to *W. caryotoides,* the *W. densiflora* of Brandis: this genus then requires further investigation). *W. nana,* Griff., is described as a small palm found near Gauhati in Assam. *W. disticha,* T. And. in Linn. Soc. Journal xi. 49; p. 6; Gamble 84. Vern. *Katong,* Lepcha, is a handsome palm of the outer hills of Sikkim, found by Brandis as far west as Kumaun in 1874. It grows to a height of 20 feet, and has distichous leaves joined at the base by a network of dark fibres. The Lepchas fell it to eat the pith of the stem near the summit of the tree. Anderson says the berries, and perhaps the leaves, irritate the skin. The wood is soft, the stem almost hollow in the centre, and the fibrovascular bundles dark brown coloured (E 878, E 2460, Darjeeling). *W. Yomæ,* Kurz ii. 533. Vern. *Zanoung,* Burm., is an arborescent species of the Pegu Yoma, with longer pinnæ and the leaves spirally arranged.

8. CARYOTA, Linn.

Two, or perhaps three, species. *C. sobolifera,* Wall.; Kurz ii. 530. Vern. *Baratahdah,* And., said by Mr. Homfray to be called the 'Sago Palm' (No. B 1045, Andamans), is a soboliferous palm of the tropical forests of Arracan, Martabán and the Andaman Islands. Griffith describes a *C. obtusa* from the Mishmi Hills resembling *C. urens,* but having more obtuse pinnules.

1. C. urens, Linn.; Roxb. Fl. Ind. iii. 625; Brandis 550; Kurz ii. 530; Gamble 84. Vern. *Rungbong, simong,* Lepcha; *Bara flawar,* Ass.; *Salopa,* Uriya; *Mhár, mardi, mari, jirúgú,* Tel.; *Conda-panna, erim-panna, utali-panna,* Tam.; *Bhyni, beina, bagni,* Kan.; *Berli,* Mar.; *Shunda pana,* Mal.; *Kittúl, nepora,* Cingh.; *Hlyamban,* Magh; *Minbo,* Burm.

A beautiful tree, with smooth annulate stem, large bipinnate leaves and wedge-shaped leaflets. The outer part of the stem is hard and durable and the vascular bundles crowded, black, very large.

Evergreen forests of western and eastern moist zone of India. On the Western Ghâts *it extends to near Mahableshwar. It is* common in Burma, Bengal, and Orissa, ascending in Sikkim up to 5,000 feet.

A. Mendis gives the weight at 71 lbs. per cubic foot, our specimen weighs 45 lbs. only, but perhaps contains more of the softer inner wood. The wood is strong and durable; it is used for agricultural purposes, water conduits and buckets. The leaves give the '*Kittul*' fibre, which is very strong, and is made into ropes, brushes, brooms, baskets and other articles; the fibre from the sheathing petioles and the peduncle is made into ropes and fishing lines, which are very strong. The interior of the stem is filled with a sago-like starch which is made into bread or boiled into gruel. Seemann says it is good and very nutritious. From the cut spadix large quantities of toddy are obtained, which is either fermented or boiled down into sugar. With regard to the length of life of the tree, Seemann says (*Popular History of Palms,* p. 135):—

"The *Caryotas* flower only once during their course of existence. The first spadix appears at the top of the tree; as soon as that has done flowering, others (latent buds) issuing from the axils, or former axils, of the leaves, make their appearance; this process, being of a downward tendency, is repeated until the last spadix, which may be looked upon as the death-knell of the plant, shews itself at the foot of the trunk, proclaiming that the hour of departure from life is at hand."

			lbs.
E	2459.	Chawa Jhora, Sivoke, Darjeeling	45
No.	44.	Ceylon Collection	71

9 ARECA, Linn.

Roxb Fl Ind iii 617, Kurz ii.
537 *Tau Luam thee*, Burm , *Abara-*
dah, —
and the Andamans *A*
gracilis, Kurz ii 538) V
Ass , is a small slender stemmed, often gregarious palm of the undergrowth in damp forests in Sikkim, Assam, Eastern Bengal and Burma , it is used for native huts and roofing in Assam The outer portion is hard with closely packed fibro vascular bundles the inner part is so soft that the cane shrinks in drying (E 3425 Dalingkote, Br Bhutan) *A hexasticha*, Kurz in Journal As Soc Beng xliii ii p 201, For Flora, British Burma, ii 539, is a small palm of Burma and *A costata* Bl , Kurz ii 538 a palm of the Andamans Griffith describes several other species, such as *A laxa* Buch from the Andamans (placed by Kurz under *A triandra* see above), *A.*
taw, Singpho, of the Naga Hills , *A*
and *A disticha*, Roxb Fl Ind iii 620,

1 — —

1 A Catechu, Linn , Roxb Fl Ind iii 615 , Brandis 551 , Kurz ii 536 , Gamble 84 The Areca Nut or Betel Palm Vern *Supari*, Hind , *Gua*, Beng , *Poka, oka, vaka*, Tel , *Camugu, paku*, Tam , *Adike*, Kan , *Adaka, cavugu*, Mal , *Puwak*, Cingh , *Kwam-thee-beng*, Burm. , *Ah-bud-dah, ah-pur-rud-dah*, And

A tall tree, attaining 100 feet in height, with a slender, cylindrical, annulate stem, the inner part of which is generally hollow Vascular bundles brown, forming a hard rind on the outside of the stem.

Cultivated throughout Tropical India

A Mendis gives the weight per cubic foot at 57 lbs The wood is used for fur- h r near handles and for scaffolding poles in Ceylon The sheaths

of betel palms are formed and these groves form often an extremely ... in tropical scenery Most villages in Bengal Burma and South India have their few betel trees

			lbs
E	419	Sundarbans	
W	769	South Kanara	
No	73	Ceylon Collection	57

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10 ENTINOKIA CODDA PANNA, Berry, Roxb Fl Ind iii 621 Vern *Codda panna*, Tel , is a slender palm about 20 feet high found in the Travancore Hills

11 ARENGA, Lab

A saccharifera, Labill , Brandis 550 Kurz ii 533 (*Saguerus Rumphii*, Roxb Fl Ind iii 626) Vern. *Toung ong* Burm is a common Malayan palm very commonly cultivated in India, and said by Kurz to be wild in the forests of Burma. The heart of the stem cont a large quantities of sago and the cut flower stalks yield a sugary sap, made into
at the base of the petioles
for cordage The palm dies a
then useful for troughs and
was so impressed with its gene
vated in India. Griffith mentions another species, *A Wightii*, from the hills about Coimbatore

12. COCOS, Linn.

1. C nucifera, Linn.; Roxb. Fl. Ind. iii. 614; Brandis 556; Kurz ii. 540; Gamble 86. The Cocoanut Tree. Vern. *Narel, nariyal*, Hind.; *Narikel*, Beng.; *Tenna, tenga*, Tam.; *Nari kadam, tenkaia, kobbari*, Tel.; *Thenpinna, kinghena, tengina*, Kan.; *Tenga*, Mal.; *Pol*, Cingh.; *Oug*, Burm.; *Jadhirdah*, And.

A pinnate-leaved palm, with annulate, often curved stem. Outer wood close-grained, hard and heavy. Vascular bundles black or dark purple, closely packed in the outer part of the stem on horizontal section, circular or uniform, enclosing vessels and cells.

Cultivated throughout Tropical India, particularly near the sea-coast.

The following experiments have been made to determine the weight and transverse strength.

	Weight. lbs.	Value of P.
Skinner in 1862, No. 49, with Madras wood, found	70	608
Puckle, 4 experiments in Mysore, bars 2 feet × 1 inch × 1 in. .	47	562
A. Mendis, Ceylon, No. 72, found ,	70	...
Warth, in 1878, the average of our 3 specimens, found .	49	...

The wood is commercially known as 'Porcupine wood;' it is used for rafters and ridge poles, house posts and other building purposes; for spear handles, walking sticks and fancy work. The leaves are used for thatching, and the net of fibres at the base of the petioles is made into bags and paper, and is used in Ceylon for toddy straining. The cut flower stalks yield toddy which is fermented or made into sugar; the kernels of the nuts are eaten, and the sweet fluid of the young nut is a pleasant drink; the thick fibrous rind of the fruit is the 'Coir' fibre, used for ropes, mats, and other articles; the shell of the nut is made into spoons and cups and other utensils; while the oil obtained from the fruit is an important article of trade and is used for burning, for cooking and in the manufacture of candles and soap. In fact, the uses of the cocoanut tree are innumerable, and much has been written about them.

			lbs.
E	417.	Sundarbans	40
W	768.	South Kanara	55
W	868.	,, ,, ...	...
B	562.	Burma	52
No.	72.	Ceylon Collection	70

13, 14, 15. CALAMUS, PLECTOCOMIA, KORTHALSIA.

Perhaps no genera of Indian forest plants are so little known as these, even those comparatively accessible, like the canes of Dehra Dún and Darjeeling, being of very uncertain nomenclature. When the collection of specimens for the Paris Exhibition of 1878 was going on, large numbers of canes were received from Burma, Assam and elsewhere, accompanied by merely native names; and being, of course, stripped of their leaves, sheaths and flowers, and tied up in the bundles in which they are sold, they had to be rejected, as the principle was not to exhibit anything whose scientific name was not known.

As far as regards the canes of Burma and the Andamans, Kurz's Forest Flora and his 'Enumeration' of Burmese Palms in Vol. xliii. of the Journal of the Asiatic Society of Bengal, 1874, are of great help; the canes of Sikkim are tolerably well known from Dr. T. Anderson's 'Enumeration of the Palms of Sikkim,' in the Linnean Society's Journal, Vol. xi., 1869; those of Assam, Eastern Bengal and Chittagong are given in Griffith's 'Palms of British East India' and the 'Flora Indica' of Roxburgh; but the whole nomenclature is confused, and the difficulties in the determination of species are very great. The following list has been drawn up giving the Indian species described in those books which have been accessible, but it should be understood that

the list is merely compiled, and that no opinion whatever is given as to the value of the specific names —

13 CALAMUS

Section I —Coleospathes

A —Erect

1 *C collinus*, Griff No 2	Khasia Hills Upper Assam
2 *C macrocarpus*, Griff No 3 (under *C erectus*, Roxb, Kurz ii 516 Enum 32)	Bhutan Duars
3 *C schizospathus*, Griff No 4, T And 1, Gamble	Sikkim Khasia Hills

E 3

very close, as usual, towards the edge

4 *C arborescens*, Griff No 5, Kurz ii 516 Enum 31 Vern *Danoung, kyenbankyen*, Burm (B 1026 Toungoo, Burma)	Pegu
5 *C erectus*, Roxb Fl Ind iii 774, Kurz ii 516 Enum 32 Vern *Sungotta*, Sylhet, *Theing*, Burm	Sylhet Chittagong, Pegu
6 *C humilis*, Roxb Fl Ind iii 773	Chittagong

B —Scandent.

7 *C flagellum*, Griff No 8, T And 2, Gamble 85 Vern *Rabi bet*, Nep, *Reem*, Lepcha, *Nagagola bet* Assam	Sikkim Assam
8 *C acanthospathus*, Griff No 9	Khasia Hills
9 *C Royleanus*, Griff No 11 (under *C Rotang*, Linn, Brandis 559, Gamble 85)	Dehra Dun, Northern Bengal.
10 *C Rotang*, Roxb Fl Ind iii 777, Brandis 559 (*C Roxburghii*, Griff No 12) The common Rattan Vern *Bet, chachi bet*, Beng, Hind, *Pepa, prabba*, Central Provinces (O 1038, Dehra Dun)	Northern India from the Jumna eastwards Central Western and South India, and Ceylon
11 *C tenuis*, Roxb Fl Ind iii 780, Griff No 13, Kurz ii 520, Enum 37, Brandis 559 Vern *Bandhari bet*, Chittagong, *Kring*, Magh, *Jalla bet*, Ass	Assam Sylhet, Chittagong and Pegu
12 *C polygamus*, Roxb Fl Ind iii 780 Vern *Hudum*, Chittagong	Chittagong
13 *C leptospadix*, Griff No 14, T And 3, Gamble 85 Vern *Dangri bet*, Nep, *Lat* Lepcha.	Sikkim, Khasia Hills
14 *C fasciculatus*, Roxb Fl Ind iii 779, Griff No 15, Kurz ii 517, Enum 33, Brandis 559 Vern *Bara bet*, Beng, *Kyeing kha*, Burm	Bengal, Orissa, Chittagong, Burma, Andamans
15 *C gracilis*, Roxb Fl Ind iii 781, Griff No 16, Kurz ii 520, Enum 38 Vern *Mapuri bet*, Beng, *Kraipang*, Magh, *Hundi bet*, Ass.	Assam, Chittagong
16 *C mishmiensis*, Griff No 17	Mishmi Hills.
17 *C floribundus*, Griff No 18	Upper Assam
18. *C latifolius*, Roxb Fl Ind iii 775, Griff No 19, Kurz ii 518, Enum 34, Brandis 560 Vern *Koral bet*, Chittagong, *Sun*, Magh, *Yamatha*, Burm (B 1001, 1003, 1027, Burma E 1004, Chittagong)	Chittagong Burma, Andamans
19. *C. palustris*, Griff No 22 (under *C latifolius*, Kurz ii 518, Enum 34)	Mergui

20. *C. extensus*, Roxb. Fl. Ind. iii. 777. Vern. *Dengullar*, Sylhet.	Sylhet.
21. *C. quinquenervius*, Roxb. Fl. Ind. iii. 777. Vern. *Hurnur-gullar*, Sylhet.	"
22. *C. montanus*, T. And. 4; Gamble 85. Vern. *Gouri bet*, Nep.; *Rue*, Lepcha.	Sikkim, Bhutan.
23. *C. macracanthus*, T. And. 5; Gamble 85. Vern. *Phekori bet*, Nep.; *Ruebee, greem*, Lepcha (E 1017, Darjeeling).	" "
24. *C. inermis*, T. And. 6; Gamble. Vern. *Dangri bet*, Nep.; *Brool*, Lepcha (E 1016, Darjeeling).	" "
25. *C. andamanicus*, Kurz ii. 519, Enum. 35. Vern. *Chowdah*, And.	Andamans.
26. *C. tigrinus*, Kurz ii. 519, Enum. 36. Vern. *Lémé*, Burm.; *Amdah*, And. (B 1042, Andamans).	Burma, Andamans.
27. *C. Helferianus*, Kurz ii. 521, Enum. 39 . .	Tenasserim or Andamans.
28. *C. paradoxus*, Kurz ii. 521, Enum. 40 . .	Martaban.
29. *C. Guruba*, Mart.; Kurz ii. 522, Enum. 41. Vern. *Kyeingnee*, Burm. (B 1031, Toungoo).	Chittagong and Burma.
(Four other species are given by Martius as occurring in Tenasserim, called *C. platyspathus*; *C. concinnus*; *C. nitidus*, and *C. melanacanthus*).	
30. *C. Mastersianus*, Griff. No. 29, under *C. Guruba*, Kurz ii. 522, Enum. 41). Vern. *Sundi-bet*, *quabi-bet*, Ass.	Assam.

SECTION II.—CYMBOSPATHES.

31. *C. nutantiflorus*, Griff. No. 31	Assam.
32. *C. Jenkinsianus*, Griff. No. 32; T. And 7. (*Cymbospathes Jenkinsianus* Gamble 85.) Vern. *Gola bet*, Ass. (E 1018, Darjeeling).	Sikkim Terai, Dúars and Assam.
33. *C. grandis*, Griff. No. 33; Kurz 523. (*Dæmonorops grandis*, Kurz Enum. 30).	Andamans.
34. *C. hypoleucus*, Kurz ii. 523 (*Dæmonorops hypoleucus*, Kurz Enum. 29).	Tenasserim.

Of these canes, *C. Rotang* is largely used in North-West India for chairs, blind and basket work. *C. latifolius* is much used in Burma for tying timber in rafts, and making the cables which stretch across the river at the Salween rope station. *C. montanus* is the best cane for suspension bridges and dragging logs in Sikkim, and *C. inermis* furnishes the finest 'alpenstocks.' No. E 1007 from the Sundarbans. Vern. *Gola bet*, has been pronounced by Dr. King to be a species new to India, which he has identified with *C. longipes*, Griff. No. 26, hiherto only known from Malacca.

14. PLECTOCOMIA.

1. *P. khasyana*, Griff. 106	Khasia.
2. *P. assamica*, Griff. 107	Upper Assam.
T. Anderson joins these two in one species.	
3. *P. himalayana*, Griff. 108; T. And. p. 11; Gamble 86. Vern. *Takri bet*, Nep.; *Runool*, Lepcha.	Hills of Sikkim, 4,000 to 7,000 feet.
4. *P. macrostachya*, Kurz ii. 514, Enum. 28 . .	Tenasserim Hills.

15. KORTHALSIA.

1. *K. scaphigera*, Mart.; Kurz ii. 513, Enum. 25. (*Calamosagus scaphiger*, Griff. 29). Vern. *Bordah, paridah*, And. (B 1041, Andamans).	Andamans.
2. *K. laciniosa*, Mart.; Kurz ii. 513, Enum. 26, (*Calamosagus laciniosus*, Griff. 27).	Tenasserim.

It may be useful to give the vernacular names of the canes sent from different localities for the Paris Exhibition, which it was impossible to name, as those who have

thaukyeng, engkyeng, toungkyeng, kyengbot, zanoung, khaboung, from South Kanara *Betha* and *nagabetha*, and from the Andamans *Boledah, jobetahdah, jobetah*, and a palm called *chardah*

16 ZALACCA WALLICHIANA, Mart, Kurz ii 511. Vern. *Yingan*, Burm, is an almost stemless palm of the tropical forests of Burma

17 NIPA FRUTICANS, Wurmb, Roxb Fl Ind iii 650, Kurz ii 541 Vern *Gulga, gabna*, Beng, *Da ne*, Burm, *Poothadah*, And (*Golphal* [fruits] Beng), is a large *soboliferous palm of the river estuaries and tidal forests of the Sundarbans*, Chittagong, Burma and the Andamans The leaves are used for thatching, and toddy is obtained from the spathe The inside of the large fruit is, when young, edible, when old it is hard like ivory, but transparent (E 1530 Sundarbans)

ORDER CVI PANDANEÆ

Two genera *Pandanus* and *Freycinetia* Of *Pandanus* the Screw Pines, there are which extend to Roxb Fl Ind iii *ta*, Beng, *Thaly-* h in swamp fores s in Bengal Beddome cccxviii, Kurz ii *O Kaiyeya*, Cingh, is a palm- Western Coast Stems grey, outer wood moderately hard, oft, spongy (E 473 E 2462, *us*, Willd, Roxb Fl Ind iii , *Kea, ketuki, keori*, Beng, *Mugalik*, Tel, *Thalay, talum*, Tam, *Kaida, thala*, Mal, *Mudu kaiyeya*, Cingh;

ORDER CVII. LILIACEÆ.

Kwam lin nel, Burm, of the Andamans, and *D spicata*, Roxb Fl Ind ii 157, Kurz ii 515, also from the Andamans, small trees *D terniflora*, Roxb *D atropurpurea*, Roxb Fl Ind ii

Cordyline terminalis, Kth., Kurz ii 516 (*Dracæna terminalis*, Roxb Fl. Ind. ii, 150), is a large shrub from the Moluccas, now extensively grown in gardens in Bengal and Burma.

To this Order also belong *Sansevieria zeylanica*, Willd, Roxb Fl Ind. ii. 161 The Bowstring Hemp Vern *Murba, murahara, murgali*, Beng, *Mallai mugi*, Salem,

Ishamacoda nar, Tel., a small perennial plant with a strong, silky fibre; and the Aloe *Agave americana*, Linn. (*A. cantula*, Roxb. Fl. Ind. ii. 167.) Vern. *Cantala, banskeora*, Hind.; *Pachakathalai*, Salem, commonly run wild or planted in all the drier zones in India and yielding a strong and useful fibre; the New Zealand Flax (*Phormium tenax*) and other fibre-producing plants.

ORDER CVIII. GRAMINEÆ.

The grasses constitute one of the largest and most important families of the vegetable kingdom, containing plants of every size from the tiny herbs of the meadows to the giant bamboos of the forests of Burma. In most forest regions of India, tall grasses cover the greater part of such land as is not too densely shaded with trees to prevent their growth; these tall grasses are found, like the species of *Arundo* and *Saccharum*, near the banks of streams; or, like the *Anthistiria* and *Androsepia*, in drier localities, covering sometimes large extents of land and rendering it liable to the evil effects of jungle fires. Such grasses have, however, many uses, and chief among them that of providing material for thatching, for in some countries in India not only the roofs but even the walls of all village houses are made of grass. The chief species used for thatch are *Saccharum cylindricum*, Linn. and *S. spontaneum*, Linn.

The tribe with which we have chiefly to deal, however, is that of the *Bambuseæ* or bamboos, which are tree-grasses, sometimes attaining enormous dimensions, sometimes scarcely more than an inch in diameter. The *Bambuseæ* have been described by Colonel Munro in the Transactions of the Linnean Society of London, Vol. xxvi, 1870, and many details are given of them by Brandis, Beddome, Kurz and other writers on Indian forests and their flora. For us it will be sufficient to give merely a list of genera taken from Munro and of such species as are described therein, as well as in other books. According to Munro, then, bamboos are divided as follows:—

Section	I.	Triglosseæ	*Arundinaria, Thamnocalamus, Phyllostachys.*
,,	II.	Bambuseæ	*Bambusa, Gigantochloa, Oxytenanthera.*
,,	III.	Bacciferæ	*Melocanna, ephalostachyum, Pseudostachyum, Beesha, Dendrocalamus, Dinochloa.*

The names given in Kurz's Forest Flora differ often from those given by Munro. Munro's names, have, therefore, been given, Kurz's names being added as synonyms and his new species quoted in the genera in which he had placed them.

GENUS I—ARUNDINARIA.

1.	*A. racemosa*, Munro. 17. Vern. *Pummoon*, Lepcha; *Pat-hioo, maling*, Nep.; *Myooma*, Bhutia, 2 to 4 feet high, with bluish, rough internodes, probably the common '*Maling*' bamboo of Darjeeling. It is very common all over the Sikkim Hills above 7,000 feet; sometimes growing to a large size ($1\frac{1}{2}$ to 2 inch diameter), and is extensively used for making mats for roofing, for fodder and other purposes.	Sikkim and Nepal, above 6,000 feet. (E 1354, Darjeeling).
2.	*A. Wightiana*, Nees; Munro 19; Beddome ccxxx.; Brandis 563, 6 to 12 feet high.	Nilgiris.
3.	*A. Griffithiana*, Munro 20, 4 to 6 feet high, internodes woolly, sometimes prickly.	Khasia Hills.
4.	*A. falcata*, Nees; Munro 26; Brandis 562; Gamble 86. (*A. utilis*, Cleghorn.) Vern. *Nirgal, nigál, ringal, nagre, narri, garri, gero*, Hind.; *Spiág, gurwa, spikso, pitso,*	Himalaya, from the Ravi to Bhutan, above 4,500 feet in the western, but descending nearly to the

No.	Species	Locality
	Kunawar, *Kwei* Tibet, *Prong*, N.-W P, ... baskets	plains in the Eastern Himalaya, Khasia Hills (H 132 Kulu, L 1339, E 3427, Darjeeling)
5	*A khasiana*, Munro 28 Vern *Namlang* Khasia, stem 8 to 12 feet	Khasia Hills
6	*A intermedia*, Munro 28 Stem about 6 to 8 feet	Sikkim 7,000 to 8 000 feet
7	*A Hookeriana* Munro 29 Vern *Praong prong* Lepcha, *Singhani*, Nep stems 12 to 15 feet This bamboo is common about Dumsong and has handsome glaucous green stems, the nodes marked by a bluish ring The seeds are edible The leaves have conspicuous transverse veins	Sikkim at 4 000 to 6 800 feet
8	*A elegans*, Kurz ii 549 Stems 12 to 20 feet	Martaban Hills

Genus II—Thamnocalamus

No.	Species	Locality
1	*T Falconeri*, Hook f, Munro 34, Brandis 563	Kumaun and Nepal, at 8 000 feet
2	*T spathiflorus*, Munro 34, Brandis 563, Gamble 87 Vern *Ringall*, Jaunsar, *Purmiok* Lepcha, *Myoosay*, Bhutia The common small bamboo of Hattu and Deoban The hard yellow stemmed red branched bamboo from Tonglo and the Singalila Range of Sikkim is probably this species Transverse veins prominent.	Himalaya from the Sutlej to Bhutan above 8 000 feet (H 131 Kulu E 3426, Tonglo, Darjeeling 10,000 ft)

Genus III—Phyllostachys

No.	Species	Locality
1	*P bambusoides*, Sieb and Zucc, Munro 36	Mishmi Hills

Genus IV—Bambusa

No.	Species	Locality
1	*B Tulda*, Roxb Fl Ind ii 193, Munro 91, Brandis 566, Kurz ii 552 Vern *Peka*, Hind, *Tulda*, *jowa mitenga*, *matela*, Beng, *Wahghi*, Garo, *Madaewah*, Magh, *Thaiwa thoukwa*, Burm The common Bamboo of Bengal The wood is strong and the halms are used for roofing, and scaffolding, mats, and other purposes	Bengal and Burma (E 1333 Sundarbans, E 1329 Chittagong, B 1321, Toungoo)
2	*B nutans*, Wall, Munro 92, Brandis 567, Gamble 87 Vern *Mahlbans*, Nep *Mahlu*, Lepcha, *Jiushing*, Bhutia, *Bidhuli*, *mukial* Ass, *Pichle*, Sylhet. A most beautiful species largely planted near villages in Sikkim and Bhutan.	Nepal, Sikkim and Khasia Hills (O 1338 Dehra Dun ?)
3	*B affinis*, Munro 93, Kurz 551 Vern *Theeshe*, *thaikwa* Burm Said by Munro to be scandent, by Kurz to be small and tufted, and 15 to 20 feet high	Martaban
4	*B teres*, Ham, Munro 95	Bengal and Assam
5	*B Falconeri*, Munro 95, Brandis 568 Vern [illegible]	North West Himalaya
6	[illegible]	Eastern Bengal and Assam
7	[illegible]	Khasia Hills
8	[illegible]	Burma [illegible]

9. *B. Balcooa*, Roxb. Fl. Ind. ii. 196; Munro 100; Brandis 567. Vern. *Balku*, Beng.; *Betwa*, Cachar; *Bara baluka*, Ass. Stems 50 to 70 feet. The best Bengal species for building and scaffolding. It differs from *B. Tulda* by its larger leaves, not pubescent beneath, and having distinct transverse veins, which are not found in *B. Tulda*.	Bengal and Assam. (E 1332, Sundarbans).
10. *B. arundinacea*, Retz; Munro 103; Beddome, ccxxxi, t. 321; Roxb Fl. Ind. ii. 191; Brandis 564; Kurz ii. 554. Vern. *Magar, nál*, Pb.; *Bans, kattang*, Hind.; *Wahkanteh*, Gáro; *Bariála*, Chittagong; *Mandgay*, Bombay; *Kati wadúr*, Gondi; *Mangil*, Tam.; *Vedru*, Tel.; *Bidungulu*, Kan.; *Wa-nah*, Magh; *Kya-kat-wa*, Burm. Stems 70 to 90 feet, spinescent. Leaves small. This bamboo is of good quality and strong, and is used for all purposes. The stems contain much tabasheer, which is used in native medicine. As a rule all the clumps in one district flower simultaneously, but isolated flowering clumps are occasionally found. Flowering years in 1804, 1836 and 1868 are recorded on the western coast, but a flowering took place also in Kanara in 1864. (On this subject see Brandis, pages 565 and 566.)	Central and South India, Burma. (O 1337, Dehra Dún; B 1319, Toungoo; W 1330, South Kanara.)
11. *B. spinosa*, Roxb. Fl. Ind. ii. 198; Munro 104; Beddome ccxxxi; Brandis 566, Vern. *Behor*, Beng.; *Koto*, Ass.; *Kinkoit*, Cachar; *Yakatwa*, Burm. (not given by Kurz, or rather, united with *B. arundinacea*, probably; a view in which Brandis concurs).	Bengal, Assam, Burma.
12. *B. orientalis*, Nees; Munro 105; Beddome ccxxxi.	South India.
13. *B. vulgaris*, Wendl.; Munro 106; Beddome ccxxxii; Brandis 568. Vern. *Kulluk*, Bombay; *Una*, Cingh. Stems 20 to 50 feet, yellow or striped yellow and green. The leaves have well marked transverse veins.	Cultivated in India.
14. *B. Brandisii*, Munro 109. (*Dendrocalamus Brandisii*, Kurz ii. 560.) Vern. *Ora*, Beng.; *Turgu-wah*, Magh; *Kyellowa, wabo*, Burm. A gigantic species, up to 120 feet high, stems often 30 inches in circumference. Flowered in Chittagong in 1879.	Chittagong and Burma, up to 4,000 feet. (E 3428 Chittagong Hill Tracts; B 1313, 1314, Toungoo.)

Genus V—Gigantochloa.

1. *G. andamanica*, Kurz ii. 556. Vern. *Podáh*, And. Stems 20 to 30 feet, thin, tufted; leaves used for thatching.	Andamans (B 1331).
2. *G. auriculata*, Kurz ii. 557. Vern. *Ta-la-ku-wa*, Burm. Stems 30 to 40 feet.	Chittagong, Arracan, Pegu.
3. *G. macrostachya*, Kurz ii. 557. Vern. *Madi*, Magh; *Wa-net*, Burm. Stems 30 to 50 feet.	Chittagong and Burma, (B 1314, Toungoo).

Genus VI—Oxytenanthera.

1. *O. nigro-ciliata*, Munro 128. Beddome ccxxxiii. (*Bambusa gracilis*, Wall.) Stems 30 to 40 feet.	Western Gháts, Chittagong, Burma, Andamans.

2	*O albo ciliata*, Munro 129 (*Gigantochloa albo ciliata*, Kurz ii 555) Vern *Wa pyoo galay*, Burm Stems 20 to 30 feet	Burma.
3	*O Thwaitesii* Munro 129, Beddome ccxxxii t 322 Vern *Watte* Anamalais Stem 10 to 12 feet 1 inch diam.	Western Ghats
4	*O Stocksii*, Munro 130, Beddome ccxxxiii	Concan
5	*O monostigma* Beddome ccxxxiii	Anamalais

GENUS VII—MELOCANNA

1	*M bambusoides*, Trin, Munro 132, Kurz ii 569 (*Bambusa baccifera* Roxb Fl Ind ii 197) Vern *Muli, metunga, bish*, Beng, garious not cæspitose, bamboo of the Chittagong Hills It is of good quality, durable, straight and with straight knots, and is very largely cut and exported for house building, mats and other purposes	Eastern Bengal, Chittagong Arracan and Tenasserim (E 1325, Chittagong)
2	*M Kurzii*, Munro 134 (*Cephalostachyum schizostachyoides*, Kurz ii 565) Stems 20 to 30 feet	Andamans
3	*M humilis*, Kurz ii 569 Stems 8 to 15 feet	Arracan Pegu

GENUS VIII—CEPHALOSTACHYUM

1	*C capitatum*, Munro 139, Gamble 87 Vern *Gobia, gopi*, Nep, *Payong* Lepcha, *Silli, sullea*, Khasia Stems 12 to 30 feet thin yellow semi scandent, strong with long internodes of about 2½ feet used for bows and arrows by Lepchas The leaves are good iboo	Sikkim and Khasia Hills. (E 1353 E 3429, Damsong, Darjeeling)
2	ern	Mishmi Hills, Ava
3	*C latifolium*, Munro 140 Leaves large	Bhutan
4	*C pergracile* Munro 141, Kurz ii 564 Vern *Tinwa, Lenqwa* Burm Stems 30 to 50 feet. Common in upper mixed forests, often gregarious	Burma (B 1317, Toungoo)

GENUS IX—PSEUDOSTACHYUM

1	*P polymorphum*, Munro 142 Vern *Purphiok, paphok*, Lepcha, *Filing*, Nep Stems green, soft, used for baskets, mats, and for tying houses	Sikkim at 4,000 to 6 000 feet, Assam (E 1310, Darjeeling Terai)
2	*P compactiflorum*, Kurz ii 567 Stems 15 to 25 feet	Martaban Hills, 1,000 to 6 000 feet
3	*P Helferi*, Kurz ii 568 Vern *Watha bo wa*, Burm Stems 20 to 25 feet, gregarious	Hills of Burma, up to 3 000 feet. (B 1318 Toungoo)

GENUS X—BEESHA.

1	*B Rheedii*, Kunth, Munro 144, Beddome ccxxxiv Stems 16 feet high	Malabar, Cochin
2	*B stridula*, Munro 145, Beddome ccxxxiv Vern *Batta*, Cingh Stems 6 to 18 feet	Bombay, Ceylon.

3. *B. Travancorica*, Beddome ccxxxiv, t. 324. Vern. *Irúl*, Travancore. Stems 6 to 8 feet. Stems densely gregarious. — Hills of Tinnevelly and Travancore, 3,000 to 5,500 feet.

Genus XI—Dendrocalamus.

1. *D. strictus*, Nees; Munro 147; Beddome ccxxxv, t. 325; Brandis 569; Kurz ii. 558. (*Bambusa stricta*, Roxb. Fl. Ind. ii. 193.) Male Bamboo. Vern. *Bans, bans kaban, bans khúrd, kopar* (stem), Hind.; *Karail* (stem), Beng.; *Bás, udha*, Bombay; *Halpa, veddar, vadúr*, Gondi; *Indo*, Kurku; *Bhiru*, Baigas; *Kark*, Pandratola; *Kauka*, Tel.; *Myinwa*, Burm. Leaves often deciduous. The stems are strong, elastic, nearly solid, 20 to 40 and up to even 100 feet high, used for spear handles, and all purposes of building and basket work. — India and Burma.

This species occasionally flowers gregariously, but generally single stems only or single clumps are found in flower.

Mr. Greig, Conservator of Forests, North-Western Provinces, writing in January 1879, reports the following interesting points regarding the flower of this bamboo in the outer valleys of the Garhwal Hills:—

"We have a wonderful crop of bamboos this year, I have been observing our bamboos a good deal lately, and I have observed numbers with one or two stems of a clump in flower, in some places as many as 5 per cent. of the clumps have flowering stems, and in others I have only found ten clumps with flowering stems out of several thousands examined. Between Kohdwara and Haldu Khata whole clumps over large areas have seeded and died, and the ground is now a dense thicket of young clumps of from 10 to 30 feet high. The seeding commenced here in 1869 or 1870, and has been going on ever since. Many of the few remaining *old* clumps are now seeding, not one or two stems, but *every stem of the clump*, and not one single instance did I see in that forest of only one or two stems in seed. These remarks apply to the forests below Gorighát and along the *base of the hills* between the Ganges and Ramganga rivers. I hope to see the bamboos of the Palim, Kansore, &c., this year, whole areas in those valleys seeded and died in 1877-78."

2. *D. sericeus*, Munro 148. Flowered in 1858. — Parasnáth in Chota Nagpore.

3. *D. Parishii*, Munro 149; Brandis 570. — Panjab. (P. 114, Sutlej.)

4. *D. membranaceus*, Munro 149; Kurz ii. 560. Vern. *Wa-yai*, Burm. Stems 40 to 50 feet. — Martaban (B 1315, Toungoo.)

5. *D. giganteus*, Munro 150. (*Bambusa gigantea*, Wall.) Vern. *Waklé, waya*, Burm. Stems very tall, often 26 inches in girth. — Tenasserim (B 1329, Moulmein.)

6. *D. Hookeri*, Munro 151; Brandis 570. Vern. *Ussey, assey denga, ukotang*, Ass. Stems 50 feet. — Assam.

7. *D. Hamiltonii*, Nees and Arnott; Munro 151; Brandis 570; Gamble 87. Vern. *Tama*, Nep.; *Pao*, Lepcha; *Pa-shing*, Bhutia *Kokwa*, Beng.; *Wah*, Mechi *Wahnok*, Gáro. The common bamboo of the Eastern Himalaya. The halms are large, 3 to 6 inches diameter, rather hollow and not always straight, but they are used for every variety of purpose. This bamboo grows gregariously, on hill-sides, up to 3,000 feet, and the stems are 40 to 60 feet high. They often grow low and tangled, instead of straight, and the bamboo may often be recognised by this — Sikkim, Bhutan, Assam (E 1341, Bamunpokri.)

character and by the very thick shoots which grow out at the nodes. The young shoots are eaten

8 *D criticus*, Kurz ii 559 Stems 15 to 30 feet. — Pegu, Yoma, at 3 000 feet.

9. *D longispathus*, Kurz ii 561 Vern. *Wuya*, Burm Stems 40 to 60 feet — Burma (B 1321, Toungoo).

Genus XII—Dinochloa.

1. *D andamanica*, Kurz ii 576. Stems scandent, up to 100 feet high — Andamans

2 *D. Maclellandii*, Kurz ii 571 (*Bambusa Maclellandii*, Munro 114) Vern *Wa nuay* Stems 60 to 100 feet, scandent. — Chittagong, Burma (B 1320, Toungoo)

The identification of the different species of Indian and Burmese bamboos is still very obscure and requires considerable research to settle accurately The large leaved
Parishii from the Punjab,
Brandis as still doubtful
are Indian, while numbers
of species are known only by vernacular names. The following of which Lepcha names are given, have been collected in Sikkim by Mr. E Fuchs *Pugriang*, a mag-
eter of 5 inches and
m, 2½ to 3 inches in
ki, pagjiok, pobong,
tracts of Chittagong,
hich has not yet been
jurria, turras, while
more whose identifi-
cation is uncertain

Section III. CRYPTOGAMIÆ.

Order CIX. FILICES.

Tree F
principally
the Weste
described
species fro
Ferns of
1880, p 425 ' Of true tree ferns there are 4 genera viz, *Cyathea, Hemitelia, Alsophila* and *Brainea*

Cyathea contains only one species from the Indian Peninsula viz. *C spinulosa*, Wall, Kurz ii 572, Clarke p 129, a small tree of Nepal, the Khasia Hills, Tenas-
In Ceylon, however, two or three
markable of which is the beautiful

species. *H decipiens*, J. Scott,
Khasia Hills, and the Hills of
secong,
lasun
unons-
Vern.
ern of
is the

In *Alsophila*, there are, as far as is yet known, seven Indian species, most of which are found in the Eastern Himalaya. *A. latebrosa*, Hook (part), Kurz ii. 573, Clarke 131, is found in Burma, while a variety of it (*A. Schmidiana*, Kze) occurs in

the Hills of Sikkim. *A glauca*, J. Sm.; Clarke 432 (*A. contaminans*, Wall.; Kurz ii. 573; Gamble 88) Vern. *Pakjik, paludúm*, Lepcha, is a splendid tree fern of the lower hills of Sikkim, Eastern Bengal and Burma. It is probably the largest Indian species, reaching a height of 50 feet, with a stem of considerable girth at the base, smaller above but widening again beneath the fronds. These fronds are very large, often reaching 10 to 12 feet in length, and the fern is easily recognized by its smooth rachis and leaves glaucous beneath. *A. ornata*, J. Scott, Clarke 432, and *A. Andersoni*, J. Scott, Clarke 433, are Sikkim species, which are very rare and but little known. They were collected first by the late Mr. Scott, in the Cinchona plantation at Rangbi, at an elevation of 2,500 feet. *A. Oldhami*, Bedd.; Clarke 433 (*A. Scottiana*, Baker; Gamble 88) is a very pretty tree fern, not uncommon about Darjeeling, and usually gregarious and branching. *A. glabra*, Hook.; Clarke 433; Kurz ii. 573; Gamble 88, is the common species of the plains. It is found in damp forests in the Sub-Himalayan tract and Eastern Bengal, from Nepal down to Chittagong and Tenasserim, Central and Southern India, and Ceylon (*A. gigantea*, Hook.; Thw. Enum. 396). It is, however, rather a small species, rarely reaching to more than 15 feet, though Clarke says it occasionally attains 50 feet. *A. crinita*, Hook., is a tree fern of South India and Ceylon reaching 20 feet in height and remarkable for its being densely covered with shaggy scales. None of these species are used in India, except that the inner part of the stems of Sikkim species is sometimes eaten by Lepchas.

Brainea insignis, Hook.; Kurz ii. 574; Clarke 571, is a tree fern of the pine forests of the Martaban Hills, at 4,00C to 6,000 feet elevation. It has a stem only 3 to 5 feet high.

Among other species of ferns, which, though not exactly arborescent, are yet remarkable and of interest in the Indian forests, may be mentioned *Angiopteris evecta*, Hoffm., a thick fleshy fern of most of the moister regions of India, with a huge fleshy root-stock and leaves which often reach 6 feet in length. *Acrostichum aureum*, Linn. Vern. *Dhekwa*, Beng. is a handsome fern, used occasionally for thatching in the Sundarbans. On the hillsides and in the forests of most of the mountainous regions of India is found the Bracken, *Pteris equilina*, Linn. *Asplenium polypodioides*, Mett. is a common large-leaved fern of the Himalaya, which has often a distinct stem of a few feet in height, and may almost be ranked as a tree fern.

The structure of the stems of tree ferns presents a great difference from that of either Dicotyledonous or Monocotyledonous trees. The appearance of the stem is usually that of a dark brown cylinder, marked above by regular scars, the bases of fallen leaves, and below by an entangled mass of fibres formed by the interlacement of roots. The inner structure is shewn by a horizontal section to consist mainly of three portions: *first*, the outer layer formed by the bases of fallen leaves and interlacing rootlets; *secondly*, the cellular tissue which occupies the greater part of the interior; and, *thirdly*, the vascular bundles which form an irregular and cylindrically arranged ring inside the cortical layer. These vascular bundles present the appearance of a closed mass of curved, usually crescent-shaped, outline, having on the outside a hard black layer of woody fibres, and inside two light-coloured layers of soft tissue, chiefly containing scalariform vessels. When dry, the cellular tissue which fills the interior contracts, leaving usually a hollow space, the ring of vascular bundles then showing a wavy pattern of alternately light and dark layers.

INDEX TO EUROPEAN NAMES.

Pages.

A.

Abelo 378
Absinthe . . . 273
Agallochum . . . 316
Akyau 316
Alder 373
Alexandrian laurel . 25
Algaroba . . . 147
Allspice . . . 188
Almond . . . 162
Aloe 426
Anacardic acid . . 108
Apple 162
Apricot . . . 168
Arbor-vitæ . . . 394
Areca Nut . . . 421
Arnotto 16
Arollo 396
Ash . . . 256, 257
„ , mountain . . 168
Aspen . . . 378, 379
Avocado pear . . 304

B.

Bael 63
Bamboo 426
„ , male . . . 430
Banyan 333
Baobab 42
Bark, crown . . . 224
„ , Loxa . . . 224
„ , red . . . 223
„ , yellow . . . 224
Barberry 13
Barwood 115
Bayberry . . . 391
Bay laurel . . . 301
Bdellium 67
Bead tree . . . 70
Beech 380
Beefwood . . . 346
Ben oil 114
Benzoin . . . 253
Betel Palm . . . 421
Birch, American paper . 372
„ , European . . 372
„ , Himalayan . 372
Blackberry . . . 165

Pages.

Blackwood . . . 127
„ , Australian . 155
Bougainvillea . . 302
Box tree . . 369, xxix
Boxwood . . . 369
Bracken . . . 432
Bramble . . . 165
Braziletto . . . 135
Brazil wood . . 116, 135
Bread fruit . . . 329
Brézillet . . . 135
Bulletwood . . . 246
„ , Andaman . 246
Bullock's heart . . 9
Bully tree . . . 241
Bunya-bunya . . 394

C.

Calambac . . . 316
Calamander wood . . 250
Camphor . . . 305
Camphor tree, Japan . 305
Camphor wood, Martaban . 305
„ „ , Nepal . 306
Camwood . . . 115
Canes 424
Caoutchouc . . 260, 261

„ , Ceara . . 348
„ tree . . 336
Caper 15
Capsicum . . . 273
Cardamoms . . . 415
Cardol 108
Carob tree . . . 135
Cashew nut . . . 108
Cassava . . . 318
Cassia cinnamon . . 306
Castor oil . . . 363
Catalpa . . . 274
Catechu . . . 154
Cedar, Atlas . . . 399
„ , bastard . . 70
„ , Himalayan . 400
„ , „ pencil . 412
„ , Lebanon . . 399
„ , Moulmein . . 78

Pages

Cedar, red . . . 355
Cherry 162
„ , bird . . . 163
Chestnut, Spanish . . 379
„ , sweet . . 379
China grass . . . 324
Chittagong wood . . 76
Cinchona . . . 223
Cinnamon . . . 305
„ , cassia . . 306
Citron 59
Civet-cat fruit . . 42
Clearing nut . . . 268
Cloves 188
Coca 58
Cocculus indicus . . 11
Cocoa 45
Cocoanut . . . 423
Coco-wood . . . 355
Coffee . . . 231, xxvi
Coir 422
Copaiba . . . 135
Copal, Indian . . 41
Coral plant . . . 365
„ tree, Indian . . 122
Cork tree, Indian . . 274
Corroyère . . . 113
Cotton plant . . . 41
„ tree . . . 41
Cowhage . . . 121
Crab, Siberian . . 168
Crotons . . . 348
Croton, purging . . 359
Currant, black . . 173
„ , red . . 173
Custard apple . . 9
Cutch 154
Cypress, Funereal . . xxx
„ , Himalayan . 410
„ , swamp . . 394

D.

Dammar . . . 394
Date 419
Datura 273
Deal, red . . . 396
Deodar 400
Divi-divi . . . 135

Pages.

Dogwood . . . 212
Durian 42

E.

Eaglewood . . . 316
„ , Malacca . 316
Ebony . . . 249, 251
Elm, common . . 341
„ , wych . . . 341
Emblic myrabolam . 352
Eng 32
Eri 209

F.

Fern, Tree . . . 431
Fever nut . . . 135
Flax 58
„ , New Zealand . 426
Fig 333
„ , India rubber . 336
Fir, Dantzic . . . 396
„ , Himalayan Silver . 408
„ , Scotch . . . 396
„ , Silver . . . 406
„ , Spruce . . . 406
Fustic 329

G.

Gale, sweet . . . 391
Gambier . . . 218
Gamboge . . . 24
Garo de Malacca . . 316
Gingelly . . . 280
Ginger 415
Greenheart . . . 313
Gooseberry . . . 173
„ , Cape . . 273
Grape vine . . . 93
Guava 190
Gugal 67
Gum Arabic . . . 150
„ benjamin . . 253
„ , blue . . . 188
„ , grey . . . 188
„ tree . . . 188
„ , white . . . 188
Gurjun oil . . . 31
Gutta-percha . . . 242

H.

Hawthorn . . . 170
Hazel 390
Heather . . . 234
„ , Himalayan . 234
Heliotrope . . . 269
Hemp, bowstring . . 425
Hemp, sunn . . . 117
Henna 200
Hickory . . . 392
Hognut 392
Hog plum . . . 113
. 82

Pages.

Honeysuckle . . . 216
Hornbeam . . . 390
„ , hop . . 380
Horse chestnut . . 94
„ , Indian . 94
Horse radish tree . . 114
Hydrangea . . . 172

I.

India rubber . . . 336
Indigo 117
Ipecacuanha . . . 219
Ironwood . . . 148
Ivy 210

J.

Jack 329
Jessamine . . . 255
Jujube 88
Juniper 411
„ , black . . 412
„ , weeping blue . 412
Jute 52

K.

Kamela 361
Kauri 394
Kino, Bengal . . 123

L.

Laburnum, Indian . . 136
Lacebark . . . 315
Lance wood . . . 130
„ , Moulmein . 207
Larch, European . . 409
„ , Siberian . . 409
Laurel, Alexandrian . 25
Laurustinus . . . 214
Lemon 59
Lign aloes . . . 316
Lilac 256
„ , Persian . . 70
Lime . . . . 59, x
Lime tree . . . 52
Linden 52
Ling 234
Litchi 97
Logwood . . . 115, 135
Longan 97
Loquat 167
Lutqua 355

M.

Mace 314
Madder 219
Magnolia, red . . i
Mahogany . . . 74
Mammoth tree . . 394
Mango 107
„ , hill . . . 102
Mangosteen . . . 22

Pages.

Mangrove . . 175, 176
Manioc 348
Maple . . . 93, 98, xv
„ , Norway . . xv
„ , sugar . . . xv
Marble wood . . . 249
„ , Andamanese 249
Margosa tree . . . 69
Marking nut . . . 111
Marvel of Peru . . 302
Mastic 106
Meadowsweet . . . 165
Medlar 169
Mesquit 146
„ , screw . . 147
Mezereum . . . 315
Mistletoe . . . 319
Moonga 309
Muga . . 304-5, 309-10
Mulberry . . . 327
„ , paper . . 322
Myallwood . . . 157
Myrabolams . . . 181
Myrabolam, emblic . 352
Myrrh 67
Myrtle 188
„ , bog . . . 391
Mysore thorn . . . 135

N.

Nanmuh . . . 313
Naseberry . . . 241
Neem 69
Nettle tree . . . 344
Nutmeg . . . 314
Nux-vomica . . . 269

O.

Oak, British . . . 381
„ , cork . . . 381
„ , holm . . . 383
„ , silk . . . 318
„ , Vallonca . . 381
Oleander . . . 264
Olive 257
Orange . . . 59, x
„ , Osage . . 329
Osiers 374

P.

Palma Christi . . 363
Palmyra . . . 416
Papaw 207
Para rubber . . . 348
Passion flower . . 207
Paulownia . . . 273
Peach 162
Pear . . . . 16[illegible]
„ nut . . . 39[illegible]
„ , prickly . . . 20[illegible]
Peepul . . . . 33[illegible]
Penang lawyer . . 41[illegible]
Periwinkle . . . 26[illegible]

Pages.
Periwinkle, Madagascar . 260
Pernambuco wood . 116, 135
Physic nut . . . 365
Pimento . . . 188
Pine, Aleppo . . . 396
" , Bunya bunya . 394
" , cluster . . 396
" , Corsican . . 396
" , Kauri . . . 394
" , Khasia . . . 396
" , maritime . . 396
" , stone . . . 396
" , Weymouth . . 396
" , white . . . 396
Piney varnish . . 41
Pistachio . . . 106
Plane 345
Plantain . . . 415
Plum 162
Poinsettia . . . 368
Pomegranate . . . 205
Poon spar . . . 26
Poplar 378
" , aspen . . . 378
" , black . . . 378
" , Lombardy . . 378
" , white . . . 378
Porcupine wood . . 422
Portia tree . . . 43
Potato 273
Privet 258
Pamelo 59
Puya 322

Q.

Quassia 63
Quince 161
Quinine 223

R.

Radix Pareiræ . . 11
Rajmehal fibre . . 265
Rambutan . . . 97
Rangoon creeper . . 179
Raspberry . . . 166
Red memel . . . 396
Red sanders . . . 131
Redwood . 115, 135, 394

Pages
Redwood, Andaman . . 130
Rhea 322
Rhododendron . . . 236
" Indian . 199
Rose 166
Rose apple . . . 193
" Guelder . 172, 214
Rosewood . . . 127

S.

Sabicu 150
Sago palm . . . 420
Sal 34
Sallow 374
Sandalwood . . . 321
Sapodilla . . . 241
Sapota 241
Sassafras . . . 313
Satin wood . . . 77
Screw bean . . . 147
" , pine . . . 425
Sebestan . . . 270
Sensitive plant . . 148
Serpent stick . . 101
Sesamum . . . 280
Shaddock . . . 59
Shell bark . . . 392
Siris 156
" , pink . . . 159
Sissoo 124
Snake climber . . 139
Snake wood . . . 269
Soapnut 96
Solah 119
Soursop 9
Spadic 58
Spruce fir . . . 406
" , Douglas . 406
" , Hemlock . 406
" , Himalayan . 406
" , Indian hemlock 408
Spurge laurel . . 315
Storax . . . 174, 253
Stringy bark . . . 188
Strychnine . . . 269
Sumach 104
" , American . 135
Sycamore . . . xv
Syringa 173

Pages

T.

Talipat palm . . . 417
Tallow tree . . . 366
Tamarind . . . 142
Tamarisk . . . 19
Tapioca 348
Tasar . . . 182, 184
Tea 30
Teak 283
Telegraph plant . . 120
Terebinth . . . 106
Terra japonica . . 218
Tobacco . . . 273
Tomato 273
Toon 77
Tooth brush tree . . 259
Torch tree . . . 230
Travellers' Joy . . 1
Trincomali wood . . 52
Tulip tree . . . 5, 43

U

Umbrella thorn . . 150
Upas tree . . . 332

V.

Varnish 110

W.

Walnut 392
" , Belgaum . . 318
Wattle, black . . 156
" , broad leaf . 156
" , common . . 156
" , golden . . 156
" , silver . . 155
Willow 374
" , weeping . . 376
Wood apple . . . 62
Wormwood . . . .

Y

Yew 413

Z

Zebra wood . . . 10

INDEX TO VERNACULAR NAMES.

Pages.

A.

Aalu 180
Abalu 230
Abaradah . . . 421
Abhúl 411
Abnús . . . 249, 251
Ach 232
Acha . . 143, 251
Achal . . 91, 354, xiv
Achár 109
Achatta 97
Achi 275
Achu 232
Achúng xxi
Adai xvi
Adaka 421
Adakun 309
Adamarathu . . . 356
Adamarram . . . 182
Adamboe 202
Adamsalí 367
Adda 139
Addalay 364
Adei . . . 215, 216
Adike 421
Adivi gerenta . . 58
Adonda . . . 15, ii
Agabathu . . . xxvii
Agal 76
Agáui 412
Agas 69
Agaso 119
Agasta 119
Agati 119
Aggai 3
Agl 148
Agla . . . 148, 155
Aglaia 92
Aglay 76
Agnara 211
Agniún . . . 84, 295
Agniú 295
Agnu 84
Ahalla 136
Ahalu 319
Ahay ¢ 297
Ah-búddáh . . . 421
Ahera 179
Ahlada 333
Ahnau . . . 220, 223
Ah-pur-rud-dah . . 421
Aigiri 235
Aila . . . 135, 150
Aima 109
Ain . . . 153, xxviii
Aini 331

Aini-pillao . . . 42
Aintha 354
Ainthia dhamin . . vii
Aipmwaynway . . 240
Aira 235
Aita 49
Aiteni vii
Aiyanepela . . . 331
Ajánta 271
Ajensak 19
Ajeru . . . 319, 320
Ajhar 202
Ak 265
Akachi 23
Akalbir 207
Akand 265
Akar-kanta . . . 211
Akas-nim 274
Akata 343
Akhaterwa . . . 69
Akhe 165
Akhi 166
Akhiari 167
Akhor 392
Akhreri 165
Akhrot 392
Akhwan xxvi
Akola 211
Akoria 106
Akota 95
Akrot 347
Akrût 392
Akshi 3
Akyau 316
Al 232
Ala 333
Ala-damara . . . 333
Alaló 180
Alangi 211
Alash 136
Alá thanda . . . 332
Alawa 339
Ali . . . 136, 232, 335
Alish 165
Alkusá 121
Alla 323
Allâdi 232
Alleri 232
Alli . . . 247, 199, 332
Allian 212
Allpeyar 64
Almora 303
Alto 394
Alti 113
Alú balú 162
Alubo 195

Alúcha 162
Aludel 331
Am 107
Ama xv
Amadum 363
Amalgúch 163
Amaltás 136
Amara 113
Amari . . . 73, 182, 350
Amatum 113
Amb 113
Amba 107
Ambabhósa . . . 140
Ambal 352
Ambari 352
Ambat 240
Ambe 107
Ambera 113
Ambhota 140
Ambia 251
Ambli . . . 142, 352
Amblu 351
Ambodha 113
Ambolati 352
Ambotha 139
Ambre 214
Amdah 424
Amdali 112
Amdi 363
Ámi . . . 104, 303
Amili 240
Amilpati 240
Amjour 112
Amla . . . 303, 352
Amlái 69
Amlanch 173
Amli . . . 139, 142, 350
Amliacha 214
Amlika 352
Amli taki 139
Amlora 303
Amlosa 139
Amlúk 252
Amluki . . . 160, 352
Amna 113
Amnia 69
Amora amari . . . 73
Ampati 269
Amphak 344
Amphi 320
Amra 113
Amrai 341
Amrer 326
Amrola 214
Amrúd . . . 168, 190
Amrút 190

Pages.
Amte 113
Amti 240
Amúdanda . . . 13
Amuk 190
Amuki 227
Amulati . . . 352
Amúr 73
Amût 320
Án 328
Anan 267
Anander . . . 396
Ananpho . . . 199
Anantamul . . . 266
Anár 205
Anchu 165
Andara 148
Andipunar . . . 177
Anduga 66
Anduku 66
Andúli 248
Andúvan . . . 236
Anemúi . . . 182
Aneru 363
Angan 256
Angiar 235
Angnera . . . 356
Angu 256
Angúr 93
Anguti . . . 351, xxvii
Ani kundamani . . 146
Ani-nar . . . 46
Anjalli 331
Anjan . . 143, 184, 199
Anjani 184
Anjir . . 338, 235, 333
Anjiri 338
Anka koli . . . xxv
Ankhria . . . 263
Ankol . . . 92, xxii
Ankola 211
Ankri . . . 165, 166
Ankula xxii
Ansandra . . . 153
Ansjeni . . . 331
Antabi 219
Antawála . . . 96
Antéri 49
Anvalla . . . 58
Aonli 352
Aor 162
Appel 295
Apta . . . 139, 140
Apúrs 412
Aradal 24
Aradi 148
Arai xviii
Arák 259
Aran 87
Arand 363
Arang 50
Arar . . . 227, xix
Arara 227
Arasa 335
Aravi mamádi . . 113
Arawi nim . . . 62
Araya-angely . . 332

Pages.
Arbambal . . . 210
Archaká . . . 205
Archarru . . . 113
Archi 140
Ardáwal . . . 236
Ardinia . . . 248
Areeta 96
Areka 140
Arendi 363
Arengi banu . . xxi, xxvi
Arfu 155
Argan 242
Arghawán . . . 116
Arhai-ka-bél . . 155
Arhar 123
Ari . . . 140, 214
Arikota . . . 179
Arinj 152
Arján . . . 184, 342
Arjún . . . 184, 272
Arjúna 184
Arjunna . . . 359
Arkaula . . . 385
Arkhar . . . 105, 106
Arkol . . . 105, 106
Arlu . . . 135, 275
Arma 186
Arma-suri . . . 18
Arni . . . 46, 298
Arremene . . . 138
Arro 140
Arrodah . . . 76
Arsanatega . . . 220
Arsúl 230
Arthil xiii
Aru . . 162, 236, 346
Arúa 64
Arunelli . . . 351
Arupatti . . . 163
Arur 235
Arwán 235
Aryili 314
Asainda . . . 119
Asam 142
Asan . . 132, 182, 379
Asana 356
Asari . . 218, 270, xxiii
Aseka 141
Asereki . . . 352
Asha vi
Ashphal . . . 97
Ashta 139
Ashúk 317
Ashunkar . . . 144
Ashwal 298
Asid 200
Askúta 173
Asmánia . . . 394
Asna 182
Asok 8, 144
Asoká 8, 144
Asothi 8
Asrelei 20
Assain 182
Assaina . . . 182
Assar sauna . . . 275

Pages.
Assey denga . . . 430
Assothi 8
Astra 139
Asúd 335
Asugach . . . 231
Asuna 356
Asunda xxi
Asura 347
Asuru 263
Aswar 53
Aswat 335
Ata 9
Atanday . . . 15, ii
Atcapali . . . 278
At-demmata . . . 295
Ati . . . 140, 144
Atki 238
Atkuri 264
Atmatti . . . 140
Atokdúng . . . 6
Atta 9
Attah bar . . . 336
Atta-jam . . . 257
Attak 17
Atteeka . . . 339
Atti 339
Atuljan . . . 239
Atundi xx
Au 323
Auga 256
Auk 265
Aulanche . . . 248
Aunra 352
Aunre 352
Aunri 352
Aupta 140
Aura 352
Auretpang . . . x
Auza 9
Avarike . . . 136
Avesi 119
Awa 323
Awal . . . 136, 155
Ayá 342
Ayar . . . . i, 235
Ayatta 235
Aykayet . . . 274
Ayma 197
Ayni 331
Azad-darakht . . 69

B.

Babbar 151
Babela 179
Babúl . . . 150, 151
Babúr . . . 87, 151
Bacha 376
Bada . . . 374, 376
Badám . . . 162, 182
Bádár . . 123, 412, 408
Badha . . . 335, 376
Badlo 86
Badoh 86
Badror 308
Badu manu . . . 344
Badúri xvi

	Page		Page		Page
Baelo	50	Balda	1,9	Bangıkat	351 3 9
Baer	88	Baleekoma	80	Ba g ro	407
Baga	153	Balengra	1,1	Bangru	136
Bagı dl úp	64	Balgay	297	Bangua	4°1
Bagh a kura	211	Balhar zengı	181	Ban gulab	167
Ba berenda	365	Balı ba neho	iii	B uharna	315
Bagfal	119	Bal bha n	xv	Ba ı	39
Bagh runga	8	Balku	4°8	Banj	56 384
Bagna		Balkun kı	251	Banjıhı	266
Bagnal	xv	Ballagı	ii	Ba jam	°40
B gın	4°(	Baloochıma	209	B n-jamāt	99
Bagnu	3,9	Balorı	11	Ba J	383
Bagr wala darim	86	Balra	1 9	Ba j r	1 9
Bagul	12	Balsu	230	Banj l atus	388
Bahan	3 8	Balut	383	Bangka	2 0
Baha vah	136	Bal va	315	Bankalla	49
Bahera ✓	179	Bamarı	340	Ba karu	116
Baherı	1 9	Bamau	8 11	Bankatı	117
Bahul	54	Bamauhattı	°99	Bankhar	°95
B ı	67 xxv	Bambal	319	Ba kl ıra	124
Ba bya	21	Bamb vay nee	197 138	Bınkhor	94
Ba cl ua	204 °99	Ban em a	2 8	Ba koı	167
Ba kal	87	Bammewa	318	Ba kunch	214
Ba kyo	°99	Bamora	212 239	B n ludar	407
Ba l	3 7	Bamaur	1	Ban marua	°80
Ba la da	198	Bamsutu	161	Ban el al	108
Ba nchampa	219	Bamtsúnt	161	I a me du	101
Ba cha		Bamul	150	Bın mussureya	300
Ba ncl ı	°61	Ban	88 319 383 384	Ban a	297
Ba nch kolı		Bana	266	Banı	153 383 387
Ba s	3 5	Banabana	xxvii	Ba n mbu	59
Burada	1 6	Banafsh	xxv	Banpala	1 J
Ba reya	1 8	Banag	136	Ba jaltı	1 J
Ba rı	206	Banalgay	237	Ban palu	3°0
Ba rmao	351	Banapu	18	Ba patara	258
Ba rula	271	Banarısh	°56	Ban pl rastu	3 J
Ba shı	3 5	Ban bakbaru 101 212	15	Bı pbu t	°56
Bajdantı	364	Ban bokul	347	Ban p ndalu	°°J
Bajur	407 417	Banchampa	5	Banraj	140
Bajur batul	417	Banchar	383	I anr tha	150
Bak	119	Banchır	84 256	Bans	4 8
Baka n	70	Banchor	84	Ba sa	158
Baka nu	°0	Bánda	319 320	Ban sanjlı	1 0
Bakalpata	10	Ban dakhur	56	Ba shagalı	101
Bakal a	351	Bandara	201 2 4	Bans kaban	430
Bakam	135	Bandarlatı	13(	Bans keora	4°(
Bakamu	135	Bandaru	220 239	Bans khúrd	430
Bakaju	135	Banderhola	8	Bansú	55
Bakar	21° 295	Ba der s r s	128	Bansua batana	386
B karcha	295 304	Banderu	101	Bansuk	1
Bakardharra	320	Bandharı bet	4 3	Bıntam man	315
Bakarja	3°0 °0	Bandhona	119	Ba tl ra	104
Bakas	281	Ban dhuka	230	Bapana burı	2°2
Bakajan	°0	Bandı gurıvenda	146	B(pattra	5
Bakhal	4 7	Ban dılla	390	Bar	333
Bakl ru	216	Ba d murududu	185	Bara baluka	1 8
Bakk amcla	105	Band r	1°1	Bara bet	4 3
Bakla	185	Ba dolat	130	Bara cl akma	355
Bakl	185	Baı dorhulla	201	Bara chalı	8
Bakra	87	Ba dr ko	101	Bara champ	6
Bakshel	3 5	Bandr j hal	73	Barachar	383
Baladah	5	Bandu	xvı	I ara dabdal bı	110
B laı	219	Bandurgı	101	Bara flawar	4°0
Bala ja	303	Bano	65	Bara garrı	7
Balashoe	xvı	Baı ga	384	Bara gorakurı	°14
Balay tımur	60 vu	Baı gab	251	Baraıburı	61

Pages.

Baráin 383
Bara jaman 193
Bara jhingni 28
Bara katús 386
Bara laiphanzeh vii
Bara manda 320
Barangi 299
Baranki 327
Barari 14
Bara-ritha 96
Bara singoli 305
Baratahdah 420
Barau 159
Baraulia 159
Barbari 261
Barbaru 340
Barbat 128
Barbatti 240
Barchar 382
Barelli 333
Bargat 333
Barhal 330
Bar hingorí 389
Bariál 140
Bariála 428
Barin 387
Baringa 46
Barinka 327
Barj 372
Barma 413
Barmera 300
Barmi 413
Baro 158
Baro-kala-goru 277
Barokoli 89
Barola 112
Baroli 117
Baror 168
Barotri 349
Barranga 43
Barrarra 265
Barru 61
Barsaj 182
Barsanga 61
Barsoli 245
Bart 163
Barthoa 224
Bartu 224
Baru 95
Barún 15
Bás 158, 430
Basak 172
Basavana páda 139
Bashal 377
Basháng arús 281
Bashkah 281
Basna 119
Basóta 295
Basri 334, 335
Bassar 14
Bassari 334
Bassein 158
Basung xxvii
Basúti 281, 300
Baswesa xxviii
Báta 87, 265
Bataganapu 222
Batala 54
Batang 168
Batangi 168
Batbar 334
Bather 55
Bathor 214
Batindu 11
Batiwa 102
Batkar 343
Batker 344
Batrachi 57
Batraj 299
Bat sinjal 92
Batta 196, 429
Bat-taman 343
Battijamb 193
Bátú 165, 345
Batúl 367
Batúlpati 11
Batwási 88, 123
Batya gingaru 227
Baunra 28
Baúnu 282
Baurala 270
Bauri 14, 179
Bauriphal 72
Baw 208
Bawa 136
Bawanek 281
Bawarœ 111
Baya 136
Bayi 67
Beati 138
Bebrang 239, 240
Bed 374, 376, 377
Bedmushk 374
Bedu 338
Beeya xvii
Begana 342
Behara 179
Behedo 179
Behetta-champagam 27
Behor 428
Behra 77
Behru 77
Beimu 162
Beina 420
Beinni 162
Beis 375
Bejalu 186
Bekkar 281
Bekkra 164
Bekling 164
Bél 63, 255
Bela 63
Belandi 78
Belanji 135
Belaunan xxvi
Beleyleh 179
Beli 377
Beligobel 42
Bel-khambi 160
Bellinandi 201
Bellipatta 42
Belorí 311
Belpatta 420
Bende-náru vi
Bendi 43
Benduga 320
Benga 132
Bengha 157
Benkar 58
Bent 375, 425
Benteak 201
Bentha 411
Bepari 57, 365
Bér 14, 88, 89, 333
Berdá 47
Beresi 239
Berfa 379
Béri 88, 89, 90, xxi
Berikuru 217
Berkúng 167
Berli 420
Bersa 158
Bersinge 279
Bersu 349
Beru 338
Berula 271
Berwaja 303
Betain 69, 70
Betar 411
Betha 425
Beti 429
Betkukri 216
Betlara 217
Betsa 370
Betta bévu 76
Betta kanagala i
Bhang jalá 207
Bettar 412
Betta tovare iii
Bettir 412
Betwa 428
Bevina 69
Bévu 69, 70
Beyguna 297
Beymadá 157
Bhabar 323
Bhadras 57
Bhagmili 105
Bhái-koi 47
Bhail 377
Bhains 376, 377
Bhaira 179
Bhajra 216
Bhalai 111
Bhálaio 106
Bhalena 224
Bhalia 123
Bhaliún 106
Bhallia 111
Bhamína 224
Bhamji 341
Bhamni 341
Bhán 104
Bhanber 17
Bhandara 229
Bhandír 158
Bhangli 376
Bhangra 319

	Pages
Bhangria	301
Bhánt	299
Bhara	176
Bharangeli	240
Bharani	226
Bharatti	87
Bhari	206
Bharhúl	xii
Bharwar	xxvi
Bhat	299
Bhatí	266
Bhatia	124
Bhat kukra	216
Bhatniggi	315
Bhaulan	224
Bhauri	351
Bhedára	412
Bhekal	18, 164
Bhekkar	281
Bhela	111
Bhelatuki	111
Bhendu	49
Bhengal	54
Bhenta	x
Bherda	179
Bheria	77
Bhes	149
Bheúl	377
Bheyla	111
Bhi	376
Bhijaul	216
Bhillaura	359
Bhillawa	111
Bhilwa	xv
Bhimal	54
Bhimbu	68
Bhimúl	54
Bhira	xii
Bhiru	430
Bhirwa	xii
Bhita	227
Bhoéa	232
Bhohár	224
Bhoj	173
Bhojinsi	113
Bhokar	270
Bhokra	159
Bhoma	351
Bhonder	50
Bhooi dalim	197
Bhor	88
Bhoráns	236
Bhorgoti	90
Bhorkund	vii
Bhosi	376
Bhotbeula	127
Bhoti	43, 271
Bhotia badám	390
Bhotuk	127
Bhoursál	224
Bhúj	372
Bhujpattra	372
Bhújru	173
Bhurkúr	224
Bhutankas	18
Bhutan kusam	359

	Pages
Bhut-bhiravi	295
Bhutrakshi	87
Bhyui	420
Biár	398
Biba	111
Bibú	111
Bibwa	111
Bichua	323
Bidái	377
Bidelganj	412
Bidhúli	427
Bidungulu	428
Bieul	54
Bihi	161
Bihri	77
Bija	132
Bijaira	*132*
Bijaúwi	390
Bijasál	132, 180
Bijasár	132
Bijgai	216
Bijo	xvii
Bikko	228
Bikki	57
Bil	412
Bila	15
Bilangra	17
Bilapatri	63
Bilási	15
Biláti	18
Bilauni	*238, 239*
Bilei kand	123
Bilga	302
Bilgu	77
Biliana	15
Bili jáli	152
Bilimbi	58
Bilin	62
Billa	278, 367
Billawar	158
Billi	123, 236
Billi matti	184
Billi nandi	202
Billu	77
Bilodar	367
Biloja	367
Bilphari	308
Bilsa	376
Bilsi	239
Billawar	158
Bilwara	158
Bimla	55
Bín	375
Bincha	18
Bindi	xxix
Biné	417
Bingah	222, 223
Binsín	239
Bintangor	25
Bipemkanta	165
Birár	89
Biridi	124
Birmi	413
Birsa	225
Bis	20, 375
Bisa	376

	Pages.
Bish	429
Bisír	168
Bisjang	68
Biskoprah	134
Bistend	251
Bisu	374
Biswúl	155
Bitha gonyer	vi
Bithá	128
Biti	127
Bítsa	375
Bítsu	375, 377
Biúl	54
Biuna	297
Biúng	54
Biúns	378
Bjooben	2
Blail	377
Bo	168, 335
Boargasella	410
Bobbi	iv
Bobich	78
Bocho	xv
Boda	201
Boda-jam	194
Bodal mowa	393
Boda-mamadi	340
Bodara	211
Bodda	339
Bodle	118
Bodle kúrú	121
Bodobodoria	xiii
Bodoka	224
Bodula	47
Boeri	270, 272
Boga poma	76
Bogay timur	60, viii
Bogod	xxvii
Bogoti	172, 239
Bogri	xiv
Bohari	270
Bohera	179
Bohl	245
Boichand	419
Boichind	419
Boilam	104
Boilshura	33
Boilsur	104
Boin	345
Boja	118
Bojeh	148
Bokal	245
Boke	355
Bokenet	10
Boklu	215
Bokmo	135
Boktok	197
Bola	42, 329
Bolas	393
Bolasbari	202
Bolashin	72
Bolay	102
Bolazong	47
Bolbek	310
Bolchim	204
Bolchú	44

Pages.
Boldak 29
Boldobak 43
Boledah 425
Bol-kadam 220
Bolkakarú 133
Bolkobak 295
Bolmengo vii
Bolmawak 95
Bolong 208
Bolpalé 86
Bolsal 34
Bolsobak 193
Boltanaro 304
Boltigachú 308
Bolú 120
Bolundúr 202
Bolur 208
Bolzel 278
Bolzuru 355
Bomair 340
Bomudu xxvi
Bondaga 201
Bondara 201
Bondgú 277
Bondorkella 204
Bono 143
Bonga sarjum xiv
Bongeri 228
Bongshing 431
Bonicha 18
Bonkapash 43
Bonurlati 136
Bonurlauri 136
Boodoom 431
Boomaiza 160
Boosairu 294
Bootayet 211
Boothgani 253
Bootigi 87
Bop 273
Bor . 333, 336, 425, xiv
Borara 140
Bor-bur 335
Bordah 424
Bordengri 200
Borderi 200
Borhar 333
Borhi 158
Borjonali 60
Borla . . . 139, 270
Bormala 282
Borogotodhara 71
Boromali viii
Boropatri xxvii
Bor-patta-jam 393
Bor-salei 66
Borthekra 22
Boru 333
Boruna 298
Bosha . . . 43, 139
Bossai 140
Bosuniya poma 72
Bot . . . 271, 333
Botanskam 87
Bottukuru 270
Boura 363

Pages.
Bouro 44
Bowala . . . 61, viii
Bráa 118
Brahmáni 84
Brahmi 341
Brán . . . 341, 387
Branchu 239
Bránkul 341
Brarna 15
Brás 236
Bratta 394
Brazen 166
Bré 383
Brekche 383
Bren . . . 341, 387
Brera 341
Breri 167
Briali 300
Brind 159
Brindall 22
Brinkol 92
Brisari 116
Broa 236
Brojonali ix
Brong 112
Brool 424
Brúmaj 343
Brúmbrúm 210
Brúndu 343
Brúrik 118
Bruru xxiii
Brus 236
Bual 272
Búbi-kowa 22
Bucha karum 186
Bucklai 388
Buda darini 197
Budá-durmi 197
Búdar 408
Budareni 15
Buddai Soom 305
Budgrat 387
Budhal 211
Búdhbola 266
Búdshúr 394
Bugari vi
Buhal 270
Búi 300
Búin 345
Búk 387
Buka 119
Búkal 245
Bukhar xxx
Bulali 365
Búldu 408
Búlkokra 366
Búlú . . . 179, 238
Bulyettra 123
Bummarri 340
Bumroti 253
Bun 231
Búna . . . 159, 345
Bun am 108
Bunamtol 425
Bundibon xv
Bundun . . . vii, xxvii

Pages.
Bunkonkri 193
Bun rhea 325
Bur . . . 332, 333
Buraga 44
Búrans 236
Búrdá 158
Búrga . . . . 44, vi
Burgouli 206
Búrgú 44
Buri 253
Buria xx
Burkunda xxiii
Burla 408
Burma 359
Búrra 408
Burramtúri 5
Burra-nuge 257
Bursu vii
Burua 363
Buruga 42
Burui xxiii
Buruju xviii
Buru mat xxx
Burúl 408
Burumb 72
Búrúnsh 236
Bururi xxiii
Burús 77
Burute 77
Burwal 427
Burzál 372
Bushau 377
Búsi 297
Bút . . . 310, 379
Búta-kadambe 222
Butallí 365
Buti 46
Butisa xxviii
Butru 256
Buzimpála 99
Bway champ 347
Bwaycheng 140
Bwaygyin 139
Bwir 376
Bya 177
Byaitsin 349
Byans 398
Byasa 132
Byebering 240
Byoo . . . 2, 176
Byoo-ben 3
Byoo-bo 177
Byooma 176

C.

Caddol 176
Calukeale 123
Camugu 421
Cangú 39
Cantala 426
Capsee 326
Carllow 2
Catappa 182
Cauna-gona 330

Pages
Cavalum 45
Cavuga 4_1
Cesı 166
Cha 30
Chachı bet 423
Chachrı 239
Chadua 91
Chaffal send 208
Cha le 262
Cha nchar 326
Chaıne 270
Chaınjlı 326
Chaıura 244
Chakbu 412
Chal ota 95
Chakro 363
Chaku 165 194
Chakua 160
Chakwa 186
Chakyaı 33
Chal 166
Chalaı 412
Cl alaın 262
Chalaı ga da 130
Chalcba 123
Chaldua 122
Challa 202
Challa mauta 354
Challe 90
Chalmerı 351
Chalta 2
Cl am 330
Chama 330
Chamaggaı 3
Ch marı 295
Chamar kas 351
Chaınb 373
Cl amba 205
Chambara 204
Cl ambar maya 341
Chaınbel 205
Chambelı 255
Chambolı 139
Chambu 194
Chamelı xxvı, 260
Chamhun 88
Cham árı 163
Chamk t 120
Chamkl arak 390
Chamkul 120
Cl amlanı 194, 240, 253
Chamlıa 315
Chamma 377
Chamo 253
Champ 5, 6
Champa 6
Champaka 6
Champakam 6
Champakamu 6
Cl au pa pur gar 200
Chamra 1_0
Chamrur 272
Chamyar 120
Chan 308
Cha ch 105
Chanangı 61, ıx

Chanda 363
Chaı dal 321
Chandan 321
Chandang 410
Chandle 270
Chandnı 263
Cl andra 261 308 310
Changathası dhup 408
Changkar 377
Changma 375 3 7, 379
Cl anı 147
Cl an at 104
Cl annı nıggı 315
Chanun 378 379
Chapra 139
Chapkıa 260
Chaplash 330
Chaplıs 330
Chappar tang 93
Chapu 373
Chapun xıx
Ch r 109
Chara 109
Charachı 54
Charaınarı 425
Charang 388
Charaı gı 65
Chardah 425
Charke nt 168
Cl arkha 311
Charkbrı 390
Charmaghz 392
Charolı 109
Charr 133
Charreı 383
Charu 109 234
Charwarı 109
Chasbıng 30 254, 257
Chaternı 92
Chatın xxvı
Chatınn 262
Chatıun 262
Chat wan 262
Cl ato 91
Chatr 91
Chatrı 13
Chattah pát 418
Cha+ung 413
Chatwa 262
Chatwan 262
Chauko 388
Chaulaı 225
Chaulı 87
Cl aulınugrı 18
Cháumkra 147
Chaunsh 92
Chauralesı 2
Chaurı 87, 176
Chechar 105
Chedwala 91
Chegarası 76
Chehur 139
Cheın 70
Chekerey 201
Cl ekıo 57, 308
Chılaun 379

Chelun 379
Chelwa 42
Chemdang 408
Chem maraın 73
Chench 165
Chendala 95
Chendbera 69
Chendra 361
Chengane 112
Cl engrung 231
Chen nge 201
Chenthakannı 363
Chenung 231
Cheongbu 413
Cheppura 139
Cherara 164
Cheratalı badu 133
Cherauuı 99
Cheraya 216
Cherıala 237
Cherı chara 343
Chermangrı 95
Cher kúsh 162
Cherolı 162
Cherpong 275
Cherrıtınga 304
Cheru pınnay 26
Cheta buta 245
Chetaın 91
Chetenta 121
Chet ı pa 224
Chetokwa xv
Cheuli 244
Cheur xxıx
Chewa 394
Chhan 236
Chhatıana xxvı
Chhota dundl era 143
Chhota kımbu 3_8
Chhota kuaıl 3 5
Chhota lewar 234
Chhur ına ıv
Ch aduk 90
Chıcl a 142
Chichanda 158
Ch cbıa 411
Chıchola 157, 158
Chıchora 158
Chıchra 1_3
Ch chrı 300
Chıchru 323
Chıcbua 158
Chıchwa 158
Ch hunt xvı
Chıkado 78
Chıkaı 150
Chıkan 84
Chık beru 70
Chıkrassı 76
Chıkrı 309
Chıktı 32
Chıkul 158
Chıkyeng 87
Ch l 306 308
Chıla 2_5 304
Chılana 169

Pages.
Chilanghati . . . 256
Chilara . . . 206
Chilatti . . . 148
Chilauni . . 29, 81
Chilbil . . . 312
Chilbing . . . 268
Chilghoza . . . 398
Chilikat . . . 371
Chilkudúdú . . . 10
Chilka dúdúga . . 8
Chilka dúdúgú . . 9
Chilkiya . . . 225
Chilla . . 206, 268, 312
Chillar 135
Chillay . . . 272
Chilmil . . . 312
Chilor 155
Chilotú . . . 311
Chilpatta . . . 420
Chilrow . . . 408
Chilta i
Chilta-cita . . . 419
Chiltu . . 268, 398
Chimal . . . 237
Chima-púnji . . . 17
Chimdi . . . 311
Chimkani . . . 136
Chimman . . . 295
Chimu . . . 328
Chimul . . . 237
Chinangi . . . 201
Chinannu . . . 162
Chinár . . . 345
Chindaga . . . 160
Chinderpang . . . 361
Chindi . . . 419
Chindu . . . 158
Ching 364
Chinia . . . 209, 210
Chinnakalinga . . 3
Chinna moral . . 109
Chínni . . . 327
Chinta . . 142, 271
Chinyok . . . 67
Chipál . . . 341
Chír . . . 396, 398
Chiria . . . 311
Chirára . . . 311
Chirauli . . . 109
Chirchirá . . . 311
Chirchitta . . . 273
Chiri . . . 398
Chirichog . . . 255
Chiriman . . . 185
Chiringi jhar . . xvi
Chiriyabaug . . . 213
Chiriyanangri . . 12
Chirmútti . . . 349
Chirudi . . . 18
Chironji . . . 109
Chiror 13
Chirorœ . . . 179
Chirúnda . . . 18
Chisi 389
Chita . . . xviii
Chitaka-mraku . . 23

Chitnityal . . . 228
Chitompa . . . 67
Chitpattra . . . 211
Chitra . . 12, 13, 101
Chitta 228
Chitta bagnu . . . 378
Chitta matta . . 228
Chittania . . . 90
Chittu 66
Chitu . . . 299, 398
Chitz 112
Chiú 398
Chiúla 123
Chiura 244
Chloani . . . 118
Chobsi 5
Chochar . . . 13
Chogu 413
Choi 158
Chokla 105
Chola 169
Chontibrik . . . 265
Chonoo . . . 359
Chooglum . . . 314
Chopar . . . 58
Chopra . . . 18, 85
Chora 383
Chorgu . . . 91
Chorpatta . . . 323
Chosi 106
Chota aryili . . . 315
Chota sinkoli . . 306
Chothu . . . 235
Chotra . . . 13
Chotte . . . 270
Chouchong . . . 183
Chouk . . . 346
Chouldua . . . viii
Choulisy . . . 199
Chowdah . . . 424
Chowra . . . 52
Chram . . . 330
Chú 368
Chúa . . . 166, 299
Chúal . . . 84, 101
Chuari 162
Chúch 412
Chúchi am . . . 108
Chúgú 300
Chúj 256
Chukissi . . . 390
Chucklein . . . xvii
Chúla 368
Chúle 163
Chúm 256
Chúmlani . . . 61
Chún . . . 327, 368
Chunari . . . 230
Chúng . . . 302
Chúnga . . . 368
Chúngi . . . 201
Chungkyek dúm . . 200
Chúni 411
Chúnt 168
Chupra 239
Chúr . . . 383, 408

Chúri 244
Chúripat . . . 230
Churna . . . 90
Chutra . . . 14
Chuwa 197
Chyai beng . . . 111
Chyo 427
Cocatiyo . . . 24
Codda panna . . . 421
Conda-mayúr . . 240
Conda-pani . . . 417
Conda-panna . . 420
Cong 95
Conghas . . . 95
Congo . . . 39
Congoo . . . 39
Congú . . . 39, 222
Corunga-manje . . 361
Cos 329
Coya 190
Cowa 24
Cuddapah . . . 196
Cummi . . . 295
Curri 390

D.

Daanga . . . xxvi
Daawoo . . . 186
Dáb . . . 212, 214
Dabdabbi . . 67, 103
Daberi . . . 87
Dabúr 262
Dadahirrilla . . . 342
Dadár 400
Dadbúri . . . 339
Dadia . . . 312
Dadki xxi
Dádúr 91
Dadúri 340
Dagdakti . . . 363
Dahan . . . 61
Daheo . . . 330
Dahi . . . 271
Dahipalás . . . 271
Dáhiri . . . 200
Daholia . . . 338
Dahu 330
Dain 209
Daintha . . . 114
Daira 264
Daiwas 271
Dajkar . . . 17, 87
Dakar táladá . . 25
Dakári . . . 210
Dákh 93
Dakhani babúl . . 145
Dakhmila . . . 105
Dakh nirbisi . . . 11
Dakki 93
Dakkúri . . . 256
Dak om . . . 220
Dál 79
Dalchini . 305, 306, 308
Dálim 205

	Pages
Dal mbe	205
Dalkaramchá	133
Dalli	79
Dalmara	76
Dalme	354
Dalné katus	389
Daloutchi	173
Daluk	368
Dalunchi	173
Dalung	215
Dalup	29 iv
Damadi	249
Daman	54
Da nar	124
Da nbel	197
Da n ne	54
Dami ak	54
Dampel	23
Damshing	215
Damú	205
Dan	200
Danda deta	xviii
Danala	v i
Dandal	18
Daudelo	294
Dandorla	308
Dandous	198
Dandua	185
Da ne	425
Dangri bet	423 424
Daugshukop	xv i
Dangs pha •	29 iv
Danoung	423
Dansagla	54
Danta	87
Da taglar	49
Dantaus	87
Dan tha lone	114
Da t	87
Dantrungi	103
Danura	96
Dan va Singali	385
Dao	xxvii
Daom	100
Dar	394
Darar	2/2
Dargola	92
Dargu	119
Dari	123
Dár m	205 354
Dasarni	104
Dasaundu	251
Dassi	255
Daswála	vi
Dáswila	105
Date	332
Datranga	2 2
Datti	200
Dau	185
Daula	352
Dauldhák	121
Dauli	2J4
Daurango	xxviii
Dauri	79
Dawa	330
Dawaihmine	175

	Pages
Dawal kurundu	311
Da ata	177
Dawi	200
Daya	282
Dayban	42
Dayshing	315
Debdari	8
Debrelara	122
Dedwar	400
Degar	340
Dehua	330
De kna	70
Dekamali	298
Del	331
Del	vi
Demur	340
Dendra	216
Dengullar	424
Denthar	282
Denvok	240 xx v
Deodar	400
Deodari	78
Deorkuda	xxv
Dephul	330
Dera	28.
Derhi	vi
Deschú	412
Deura	28
Deutsch	173
Devadaru	8 58
Devadaru n	vii
Dera ka ch n	140
Devi d ar	410
Dewan	271
Deya danga	276
Deya na	.7
Dhadoujra	101
Dhai	200
Dl á an	271
Dha m	271
Dl aiwan	271
Dhak	123
Dhakka	87 255
Dl akki	350
Dl akur	262
Dháman	271
Dhau n	54
Dhamman	54 55
Dhamna	342
Dhamni	54 55
Dhamono	54
Dhamora	185
Dl amu i	55
Dhandia n	118
Dl ani	354
Dháo	330
Dhaoli	294
Dháori	185
Dharauli	264
Dharmara	2 8
Dhatela	164
Dl atte	2 5
Dhatti	87
Dhau	185 187 330
Dhaula	.00 266
Dhaula khejra	150

	Pages
Dl auli	.24
Dhaukra	185 187
Dhaunda	185
Dhaundak	186
Dhaura	90 185 186, 200
Dhauri	90 185
Dhauta	185
Dl avada	185
Dha va	185 186
Dhedu mera	310
Dhekwa	432
Dhengan	271
Dhenıani	81
Dher	165
Dheu	330
Dheugr	3
Dhe vti	200
Dhi	200
Dl obe n	129
Dhobela	179
Dhobu	185
Dhohan	53
Dhokri	185
Dholtu	267
Dhondel	139
Dhondri	139
Dhorara	139
Dhorbeula	132
Dhota mara	279
Dhotte	2 9
Dhowda	263
Dhudi	261 263
Dhuna	68
Dh ndera	139
Dhundul	74
Dhu n	408
Dl up	64 396 411 412
Dhupa	41
Dhupi	412
Dhup maram	41
Dhupri chai dan	412
Dhura	338
Dhuvi	2 0
D ar	260 400
D bru	103
D driar	148
D er	11
D gl lati	310
D glotti	310
D hgan	.71
Dikamali	2 8
D meri •	339
D ndal	186
D ndlu	186
Dinduga	186
Dingan	23
D ngdah	174
D ngim	381
D ngir	350
Ding ng	385
Di gkain	106
D ngkurlong	70
D nglaba	393
D nglatterdop	• 305
Di gl en	372
D i gori	• 71

Pages
Gai aswát . . 335
Gaiger 229
Gaik 49
Gainti 146, 324
Gair 258
Gaira viii
Gajachinni 87
Gajer kota 226
Gajiun 335
Gajkai . 135
Gajna . 335
Galay . 227
Galboja 398
Galdu 258
Galeni 93, 213
Galgal . 17
Galgoja 398
Galion 169
Galka 166
Gallah . 425 xxx
Gallu 413
Gal mendora 144
Galmora 164
Galwail 11
Gamari 359
Gambari 295
Gambu 195
Gamgudu 206
Gamhar xxix
Gan 261
Gandal 213
Gandalun 315
Gande 315
Gandera . 261
Gandha 321
Gandi 19 61, ix
Gandla 61, ix
Ganerí . 17
Ganga . 66
Gangai . 361
Gangal 17
Gangam . 17
Gangaraya 43
Gangáru 226
Gangau 27
Ganger 54, 92
Gangerun 54
Gangichu . 368
Gango 64
Gangr . 89
G ngru 226
Gangwa 368
Ganhila 293
Ganhira 264
Ganhula 213
Ganiar 17
Ganj 118
Gánjan 356
Ganná 215
Ganniari . 295
Gant . ix
Gantl a . 255
Gánti malle . . 76
Ganuga . 133
Gara batana xx
Gara besel xx
Gara kuda xx
Gara lol adaru xxix
Garanji 133
Garar 241
Garari 358
Gara saikre xxi
Garbadero 261
Garbijaur 310
Gardal 147
Gardalu . 162
Gardar . . 102
Gardhan 92
Gardúndi . 21
Garga 67
Gargas 55, 354
Gari 65
Garinda 261
Garja . 67, 110
Garkath 171
Garkum 211
Garmchal 170
Garna 261
Garodosal , 129
Garpa shola . . 367
Garpipal 379
Garrah 65
Garrar 358
Garri 171, 426
Garshuna . 19
Gar silung 19
Garso 156, 158, xix
Gar tashiára 325
Garudar 301
Garuga 67
Garum 359
Garur 84 258
Gasskeala . 123
Gattao nittul 327
Gauli 356
Gaunta 239
Gausam 95
Gavuldu 197
Gaya xx
Gaz . 19
Geang 217
Gebang 417
Gebokanak . 172
Geggar 229
Geh . . 390
Geia . . 357
Geio . 357
Geli . 413
Gempó asela 166
Gendeli poma . 67
Gendelli poma . 72
Gengri 128
Geor . 368
Gera . . . 227
Geredi . . . 145
Geria . . 368
Gero . . 426
G ti . . . 324
Ghain . 318
Ghansingh . 279
Ghant . 92, 255
Ghanta patali . 255
Ghantiáli 1
Ghanto . xxv
Ghari am 107
Gharri 110, 354, x
Ghattár . 255
Ghato xxv
Ghatonli xviii
Ghattol xiv
Ghazlei . 19
Ghebu nelli 295
Gheru . . . 111
Ghesi . 382
Ghia 256
Ghiwáin 317, 318
Ghiwala 282
Ghogar 67, 209
Ghonas 236
Ghónt . 90
Ghorkaram x
Ghotia xiv
Ghund 34
Ghunia . 259
Ghunja 67
Ghurga 228
Ghuttía . 207
Ghwareshtai 162
Ghwi 339
Gia . 67
Giam 400
Gian . . 295
Gianru . 170
Gidar dák . . 163
Gidur-dak . 92
Giduri 270
Giggar 89
Gilas 162
Gilchi 272
Gilla . 145
Gilo xvii
Gineri 294, 295
Gingaru . 170
Ginnuna 207
Ginyan . 110
Gíra . . . 373
Girarí . 206
Girchi . . 206 263
Girg tti . 59
Giringa vii
Girk . 354
Girthan . 92, 354
Girya . . 77
Gish . . . 390
Gitoran 15
Giur 376
Gniet 396
Gnoogyee . 136 138
Gnooshay . . 136
Gnoothein 136
Gob . . 110
Gobar mowa . 393
Gob a . 429
Gobli . . . 151
Gobla . . 340
Gobria 56
Gobria Sulah . 408
Goda . 298

Pages.

Goda kadúru . . . 269
Godapara . . . 4
Goden . . . 270
Goechassi . . . 29
Goeblo . . . 282
Goganda . . . 29
Gogar . . . 229
Gogarli . . . 229
Gogatti . . . 215
Gogay champ . . . 7
Gogdi . . . xxvii
Gogen . . . 29
Gogera . . . 124
Gogina . . . 29
Gogra . . . v
Gogsa . . . 91, 92, 239
Gogu . . . 150
Gogul-dhúp . . . 64, 68
Goher . . . 92
Gohinla . . . 219
Gohora . . . 294
Goindú . . . 251
Goira . . . xviii
Gojál . . . 110
Gojár . . . 116
Gojé . . . 356
Gók . . . 6
Gokatú . . . 24
Góki . . . 255
Gokpak . . . 103
Gokul . . . 29
Gol . . . 344
Gola bet . . . 424
Golainchi . . . 260
Golak . . . 425
Gola mohani . . . 302
Golancha . . . 11
Golari . . . 133
Goldia . . . 185
Golka . . . 324
Gol kamela . . . 351
Golpatta . . . 419
Golphal . . . 425
Gólra . . . 185
Gol-shingra . . . 388
Gomari . . . 295
Goncha . . . 121
Gondan . . . 270
Gondi . . . 270, 271
Gondhona . . . 294, 352
Gondni . . . 271
Gong-nyin-ya . . . 347
Gongo Scoli . . . 255
Goui . . . 332
Gonjha . . . 118
Gonjo . . . 118
Gon-kadura . . . 262
Gonta . . . 28
Googgilapu-Karra . . . 39
Gophla . . . 12
Gopi . . . 429
Gora Chand . . . 120
Gorak imli . . . 42
Gorakurri . . . 214
Goran . . . 176
Gorantlu . . . 200

Pages.

Gor aunsa . . . 419
Goria . . . 390
Gorkatri . . . 117
Gorklu . . . 344
Gormi-Kawat . . . 64
Got . . . xiv
Gota gamba . . . 24
Gotaha . . . 90
Gotho . . . 261
Goti . . . 90
Gotoboro . . . xiv
Gouri bet . . . 424
Gour kassi . . . xxix
Govarnellu . . . 355
Govorpongyota . . . 71
Gray . . . 140
Greem . . . 424
Grelu . . . 339
Grui . . . 84
Gua . . . 421, xxvii
Guakoli . . . xxv
Guara . . . 317
Gua supari . . . 421
Gubadarra . . . 49
Gubermowa . . . 351
Gúch . . . 214, 215
Gudlei . . . 92
Gudúmbal . . . 106
Guga . . . 32
Gúgal . . . 34, 67
Gúgala . . . 67
Gugera . . . 29, v
Gúggal . . . 412
Gúggar . . . 66
Gugu . . . 94
Gugul . . . 239
Gúgulu . . . 66
Gúhor . . . 169
Gui . . . xxiii
Gú-kikar . . . 150
Gúla . . . 396
Gulab . . . 167
Gulab jaman . . . 193
Gul achin . . . 260
Gulal . . . 248
Gúlar . . . 338, 339
Gul-bodla . . . 46
Gúldar . . . 101
Gul daúr . . . 260
Gule . . . 81
Gúlga . . . 425
Guli . . . 15
Gúlíli . . . 258
Gul-kandar . . . 46
Gulla . . . 410
Gulnari . . . 79
Gulunashtar . . . 121
Gulrai . . . 410
Gulsima . . . 82
Gúlú . . . 46
Gumadi . . . 295
Gumai . . . 295
Gumar . . . 197, 295
Gumar.tek . . . 295
Gumbar . . . 295
Gumbengfong . . . 327

Pages.

Gumbong . . . 133
Gúmgacha . . . 258
Gúmi . . . 69
Gummar . . . 197
Gumodi . . . 123
Gumpini . . . 110
Gumpna . . . 110
Gumpri . . . 110
Gumudu . . . 295
Gunacha . . . 166
Gunchi . . . 121
Gundali . . . 219
Gundha badhuli . . . 219
Gundi . . . 271
Gundroi . . . 306
Gundrow . . . 227
Gung . . . 146
Gúngat . . . 229
Gunglay . . . 17
Gúngú . . . 17
Gunhi . . . 159
Gunj . . . 133
Gún palos . . . 169
Gunradah . . . 104
Gunserai . . . 306
Gúpni . . . 67
Guracha . . . 166
Gurapu-badam . . . 45
Gurar . . . 158, xvi
Guras . . . 235, 236, 237
Gurbári . . . 158
Gurcha . . . 11
Gurgoti . . . 18
Gurgúli . . . 349
Gúrgúra . . . 241
Gurhul . . . 42
Guri . . . xxiii
Guria . . . 176
Guriál . . . 139, 140
Guri karam . . . xxiii
Gurinda . . . 164
Gurja . . . 67
Gurjo . . . 11
Gurjun . . . 31, 33
Gurkur . . . 158
Gurl pata . . . 61
Gurmala . . . 136
Gurmunghan . . . 314
Gúr mussureya . . . 350
Guról . . . 227
Gwep . . . 103
Gwyootnway . . . 393
Gyasay . . . 332
Gyengmnope . . . 240
Gyesa . . . 122
Gyoben . . . 95
Gyobo . . . 74
Gyopho . . . 73
Gyútbeng . . . 251

H.

Haddoka . . . 366
Haddú . . . 212
Hadga . . . 119
Hadra . . . xi

	Pages		Pages		Pages
Hádru	251	Harre	5	Hıtta .	142
Ha s	15 n	Harrerı	156	Hıtterlu	17
Hajam	xxvıı	Harrı	ıx	H ttum	46
Hajeru	148	Harro	180	Hıtun	xv ı
Hake humű	ı	Har u	212	H un garna	ı ı
Haktapat a	344	Has ghar	204	Hloprongzam	209
Hakun	348	Hartho	354	Hlosablot kuı g	163
Hal	41	Harwar	152	Hlos pha	29
Hala	65 212	Harwarı	xxı	Hlos rı	386
Hala lwa l	58	Hasur gunırı	129	Hlosunglı	372
Halamba	290	Hatana	xvııı	Hlyambau	490
Halbambar	210	Hatchanda	46	Hlyanpyoo	45
Halda	77	Hat an	49	Hman	50 62
Haldu	220	H tı ankusa	xxvıı	Hmanth n	307
Haleo	219	Hatt paila	40	Hnaubeng	290 xx ı
Halı	242	Hauha	308	Hne ı gpyo ı g	110
Hal wára	122	Há r	37-	Hodung	3 8
Hall naddı	182	Hauza	150	Holay	241
Hallorny	110	Havul ge	135	Holda	183
Hal me lora	144	Hawar	276	Holle tupra	2 2
Halm lhla	52	He bılsu	331	Hollock	185
Halpa	430	Heb bevu	69	Hollong	31
Halra	180	Hebbalsu	331	Holonda	2-0
Halsı	241	Hebbelsu	329	Hom	280
Halsına	399	Hedde	220	Hona	209
Halsu	399	He lu	290 222	Honal	182
Hamára	113	Heela	24	Hoı dapara	2
Hambar maya	372	Heerda	180	Honge	243
Hammadı	210	Heggarj ge	261	Ho né	131 132
Ha nparandella	361	Hel	xvı	Hooday	278
Hamrı	147	Hesar	xxvııı	Hood golla	241
Hamu	256	He el	xx	Hooloonı	28
Haı chu	84	Hessare	ı	Hoom	9 10
Háne	94	Hıśs n n	256	Hoore mara	158
Ha gkyow	45	H l	xvıı	Hoor a	311
Ha j l	184	H er	11	Ho á	33
Hant ge	135	H jal	196	Hor na	298
Hanúdun	94	H julı	108	Horralu	8?
H nuz	256	H kpı	117	Hortuckı	181
Haoul	372	H la auwal	238	Horu surat	3 3
Happur malı	261	H l ka	181	*Hote baghı*	*160*
Har	180 204	H l kl a	180	Hotsıgé	135
Harılu	363	Hımalcl erı	240 350	Ho ka	4-5
Harı ra	180	H nan	103	Hpalan	140
Hara saıjung	xxv	H nu	378	Hrupr.kbın	360
Hara seju ı	xxvı ı	Hındı	419	Hsay ma kyee	210
Hardı	232	Hınga	141	Hseng neng thavet	108
Har lu	2-0	H ngan	65	Htaınbyoo	213
Harduli	81	H n ı an	103	Htan	176
Ha f rurı	351	H ngol	65	Hteınthay	222
Hargesa	2	H ngorı	388 389	Htoukına	124
Harı	61 162 xv ı	H ıgota	65	Htouksha	98
Har lo	-64	Hıngu	65	Huara	310
Harı kekra	191	H ngua	30	Hu lum	493
Har ları	356	Hınjaru	xxı	Hulashıng	105
Harıı larra	73	Hı tal	419	Hul a	169
Harınkhana	73	H ppé	244	Hul chellu	3? 1
Har takı	80 181	H r	180	Húlgerı	112
Harje ırı	11	H rek	251	Hulı makay	102
Harku	106	H rı kaddol	176	Hulluch	173
Harla	180	H rojalı	136	Hı luva	182
Harnaulı	63	His	15 n	Hulvé	182
Harra	180	Hısalu	166	Hum	256
Harránı	*129*	*H sl alu*	*166*	*Humba*	*10*
Harrarı	155	H tal	413	Humb lh	217
Harray baer	30	Hıtı	3?-	Humbu	20

Pages.

Humwah . . . ix
Hunaso . . . 142
Hundibet . . . 423
Húngay . . . 133
Hupu . . . iii
Huragalu . . . 77
Hurchu . . . 319
Hurku . . . 106
Hurnur gullar . . 424
Hursing . . . 255
Húrúa . . . 367
Húrúnay . . . 170

I.

Icha . . . xxi
Ichal . . . 419
Ijál . . . 196
Ijar . . . xxi
Ije . . . 294
Ikti . . . 347
Iktibi . . . 354
Ilavam . . . 42
Illar . . . 11
Illavam . . . 44
Illinda . . . 248
Illupi . . . 243
Imar . . . 390
Imbri . . . 387
Imbúl . . . 42
Imli . . . 142
Inai . . . 387
Ind . . . 363
Indak . . . 271
Indo . . . 430
Ind-rendi . . . 363
Indri . . . 387
Induga . . . 268
Indupa . . . 268
Ingar . . . 196
Ingini . . . 268
Ingua . . . 65
Injin . . . 355
Inzar . . . 338
Inzarra . . . 53
Ippa . . . 241
Ippi . . . 243, 244
Ira . . . 214
Irak . . . 259
Iramballi . . . 247
Irapú . . . 144
Irhú . . . 243
Iriki . . . 270
Irki . . . 270
Irkuli . . . 87
Irrip . . . 243
Irubogam . . . 40
Irúl . . . 148, 430
Iruli . . . 308
Irum . . . 355
Irún . . . 89, 298
Irúp . . . 243
Iser . . . 162
Ishamacoda nar . . 426
Ishi rashi . . . 94

Pages.

Ishwarg . . . 261
Itah . . . 49
Iti . . . 127
Itola . . . 136
Itsit . . . 300
Iwara memadi . . 23

J.

Jabba hingori . . 56
Jadhirdah . . . 422
Jadi . . . 283
Jafra . . . 16
Jagalagante . . 251
Jagarua . . . xviii
Jagat-madan . . 281
Jaggarwah . . . 136
Jaggra . . . 136
Jagguchal . . . 235
Jagrikat . . . 308
Jagúri . . . 332
Jagya-domur . . 339
Jagya dumar . . 339
Jai mangal . . . 279
Jaiphal . . . 314
Jait . . . 118
Jál . . . 260
Jalamút . . . 233
Jalaranda . . . 34
Jalári . . . 34
Jal bágú . . . 214
Jaldaru . . . 162
Jalghoza . . . 398
Jali . . 150, 425, xxx
Jalidar . . . 53, 91
Jalla bet . . . 423
Jallaur . . . 139
Jalpai . . . 57
Jam . . 29, 193, 194
Jama . . . 190
Jaman . . . 194
Jamana . . . 163
Jamára . . . 215
Jamawa . . . 194
Jamba . . . 148
Jambé . . . 148
Jambu . . . 147, 148
Jambúl . . . 194
Jambun . . . xx
Jamla . . . 184
Jamne-munda . . 13
Jamni . . . 194
Jamo . . . 194
Jamrási . . . 87
Jamti . . . xx
Jamu . 163, 194, 258, 336
Jamuda . . . 176
Jámun . . . 193
Ján . . . 323
Jana-pa-laseru . . 349
Jand . . . 117
Jangal-ka parúngi . . 382
Jangi . . . 390
Jangli . . . 334, 419
Jangli-badam . . 45

Pages.

Jangli-bendi . . 52
Jangli frast . . 378
Jangra . . . 89
Janjhan . . . 118
Jantia . . . 255
Janumjan . . . xiv
Janwa . . . 87
Jára . . . 55
Jarat . . . 16
Jargi . . . 200
Jari . . . xxviii
Jarika . . . 425
Jarila . . . 317
Jarjo . . . xxi
Jarlangei . . . 216
Jarri . . . 155
Jarúl . . . 202, 203
Jarul-jhalna . . 204
Jassundi . . . 144
Jasúnd . . . 332
Jati . . 314, 255, 283
Jatiko . . . 200
Jati-koroi . . . 158
Jatrasigi . . . 281
Jau . . . 19
Jaún . . . 345
Jauntari . . . 314
Jauri . . . 255
Jauthalla . . . 262
Jawa . . . 214
Jawása . . . 119
Jayanti . . . 118
Jayat . . . 425
Jazúgri . . . 332
Jegachu . . . 107
Jeljambu . . . 364
Jembút . . . 146
Jerimu . . . 100, 101
Jerra . . . 319
Jewan-putr . . . 353
Jewi . . . 334
Jhaggar . . . 418
Jhál . . . 259, 260
Jhán . . . 255
Jhand . . . 147
Jhár . . . 259, 260
Jharchampa . . xxvii
Jhari . . . 89, 419
Jhar katchura . . 269
Jhatéla . . 164, 295, 311
Jhau . . . 19, 182
Jhaugra . . . 418
Jhaujhauka . . xxiii
Jhenok . . . 15, ii
Jhera . . . 179
Jhijan . . . 118
Jhijir . . . 218
Jhind . . . 152
Jhingan . . . 110
Jhingni . . . 28
Jhinja . . . 139
Jhit . . . 259
Jhora . . . 412
Jhunok . . . 59
Jhuri . . . 320
Jial . . . xv

Pages
J'ı puta 393
J bang xı
J d 108 111
J dı mam dı 108
J dkar 17
J g nı 344
J krı 315
J narı 414
J ndı 327
J ntı 164
Jír xv
J rı 111
J rugu 490
J tangı 197
J tegı 197
Jınsh ng 49
J vputrak 353
J yal 110
Jobetnh 495
Jobetahdah 495
Jog a padera 259
Jog mallata 361 363
Jojo xv
Jok 355
Jondrı 319
Jonkaphal 49
Jonua 339
Jor xx
Jotı 393
Joufra 359
Jovı 334
Jowa 497
Joweca 318
Juar 255 256
Judapa 208
Juı 231
Júm 67
Jung song 194
J no 419
Jupong 341
Jurı pakrı 338
Juta salpanı 190
Jut 61 393
Jut l 175
Jutru 239
Juwa 42

K

Ká 399
I aak avenak 365
Kant a unak 365
Kabaı j pal 335
I abal 160
K bashi 99 100
Kal a a 14
Kabbar 259 260
Kabooay 197
Kabotang 399
I ábra 14, 338
Kabul 3 8
I achal 40
Kacl ánı 349
Kachan 107
Kach eng 385

Pages
Kache n 70
Kacheyta 148
Kachıa udal 49
Kacl k 140
Kach padel 230
Kachír 212
Kachleı 19
Kachlora 145
Kachnal 139
Kachnar 138 140
Kachrı 263
Kachúr 212
Kachuria cháll 296
Kadaga 290
Kadakaı 180
Kadal 201
Kad lı 202
Kadam 290 305
I adı má 269
Kadamı 49
I adamba 220
I ad mbo 290
Ka lam c 196
I adanı 999
Kadapgnam 8
Kad bevu 70
Kaddam 220 299
Ka lda va lu 990
Kadd b kkı 169
Ka leoh 210
Kadera 82
Kaderu 311
I adet 15
Ka lewar 86
Kad sben 358
Kad kanagal ı 1
Ka lmero 310
I adna 910
Ka locımba reya 950
Kadol 176
Ka lot 310
Kadrajuvı 353
Ka lratı 265
I ads ge 160
Kadsura 4
I adu 18
Kadukar 180
Ka lung 299
Kadu gbı 299
I a lwal 290
Kad var 299
I ag 49
Kagbl alaı 305
Kagl ak 173
I ághan a 101
Kaghutı 314 315
Kagı 112
I agıra 119
I ag rı 336
Kagl 193
Kagpl ulaı 105
I agsar 315
Kagsha 219 340
Kagsl 219 399
Kal akaala 218
Kahatta 19

Pages
Kabbang 319
Kah mmal 334
Kahu 184
Kal ua 184
Kahukr k 218
Kahundan 86
Kahwa 231
Kaı 341 390
Ka da 495
I a day 253
Ka ger 193
Ka kar 67
Ka kra 67 110
Ka kun 18
Kail 398 407
Ka m 334
Ka mu xı
Káın 341
Ka ncho xvı
Ka ng go 97
Ka njal 395
Ka phal 391
Ka r 393
I a t 62
Ka ta da 330
Ka zaban 235
Káj xxvı ı
Kaj xxv ı
Kajeı 166
Kajo 180
I ajpatı 208
I ajra 269
Kaju 108
Kajutalam 166
Kajjang 208
I ak 338
Kaka 18 106 xxv ı
I akamn al 339
Kakar s ngi 106
Kaka suroli 218
Kaka tat 251
I aka ul mera 251
Kakeı 18
I aker 18
Kakhum 239
Kakı 136
Kakaar 106
Kakke 136
Kakkeran 105
Kakkı 54
Kakkreın 105
Kakkrí 98
Kakmárı 11
Kakoa 17
Kaka-dumar 310
Kakor 90
Kakra 12 1 xx ı
Kakrangel e 106
Kakrı 105 14
Kakrıa 123 201
Kakr ng 106
Kakru 101
Kakah 212
Kaktay 56
Kakún 354
Kakurı 310

	Pages.
Kal	323
Kala-aja	272
Kala akhi	165
Kala aselu	166
Kala aunsa	419
Kala bogoti	354
Kala chakma	385
Kala champ	6
Káládri	342
Kala dhaukra	187
Kala goindu	251
Kala gorú	278
Kala hisalu	165, 166
Kala inderjau	261
Kalakat	163
Kala kharani	254
Kala kiamoni	257
Kala kúdú	261
Kalalag	88, 90, 91
Kalaloari	302
Kalam	222
Kalamet	322
Kalamukha	87
Kala palás	119
Kalarukh	127
Kala saháju	182
Kala sakena	117
Kala siris	160
Kala titmaliya	214
Kalauri	46
Kalawar	166
Kalay	81
Kalay bogoti	240
Kal baghi	157, 160
Kalban	312
Kalbow	40
Kalchang	377
Kalchua	181, xxviii
Kalé	223
Kaledzo	304
Kalet	272
Kalga	163, 166
Kalgante	255
Kali gurás	236
Kali harreri	158
Kali hurchu	234
Kalikat	223
Kalikatha	239
Kalikaura	69
Kalilara	179, 265
Kali maruthai	183
Kaliudra	100
Kalipat	16
Kaliring	383
Kalitaka	14
Kaliún	418
Kaljendru	4
Kal kilingi	78
Kalkora	1, 59
Kallai	3
Kallain	410
Kall-alun	334
Kallam	222
Kal-lau-tso	16
Kallei	3
Kalliacha	166
Kall-udi	278
Kalma	xxiv
Kaloomidereya	250
Kalp briksh	42
Kalpoon	26
Kalrai	408
Kalrei	408
Kalru	46
Kalsis	156, 238
Kaltega	i
Kalthaun	272
Kal tharingi	158
Kalúcho	82
Kalu habaraleya	247
Kaluwara	251
Kamal	142, 361
Kamanji	356
Kamaranga	58
Kamarri	228
Kamaung	202
Kamba	234
Kambal	106, 361
Kambalu	64
Kambar	136
Kambhar	295
Kambi	228
Kamboong	317
Kamela	361
Kamhyem	326
Kamini	61
Kamkata juli	347
Kamki	162
Kamkúi	356
Kamlai	110
Kamli	324, 325
Kamli-mallata	361
Kammaregu	330
Kamo	176
Kamti	58
Kamra	143
Kamrang	58
Kamrong	59
Kamrup	336
Kamwepila	61, ix
Kanachi	165
Kanagala	260
Kanagalu	3
Kanagi	314
Kana-goraka	24
Kanai	339
Kanait seik	324
Kanaizu	354
Kanak	92
Kanak-champa	49
Kanalla	141
Kanapa	196
Kanazo	354
Kanazo-taloo	86
Kancha	215
Kanchan	138, 140, 251
Kanchanamu	6
Kancheli	101
Kanchini	138
Kanchivála	140
Kanchivala-do	140
Kanchupranthi	363
Kánda	82, 363
Kandagaug	42
Kandágar	364
Kandahára	18
Kandalanga	74
Kandan	140
Kandara	82, 212
Kandaru	100
Kandeb	25
Kandei	17
Kander	14
Kandhára	18
Kandi	147
Kandiári	86, 88, 166
Kandika	88
Kandi kattar	18
Kandla	141
Kandlar	82
Kando	135
Kandol	46
Kandre	407
Kandru	342
Kandu	86
Kandu-gogu	17
Kanemis	87
Kaner	264
Kanera	219
Kanga	133
Kangali	139
Kangar	105, 106
Kangei	222
Kanghi	169
Kangi	225
Kangji	333, 334
Kanglu	345
Kangshior	235
Kangu	17, 256, 273, 324
Kanguni	86
Kanhil	200
Kanhlyem	46, 47
Kanhya	339
Kaniár	136, 140
Kaniga	133
Kaninchi	398
Kaníra	264
Kaniúri	210
Kanj	61, xxviii
Kanjalúta	266
Kanjar	101
Kanjara	100
Kanjaram	269
Kanji	91
Kanjú	17, 342
Kánk	18
Kánki	18
Kankoli	318
Kankra	177, 226
Kankrei	123
Kanla	141
Kanlao	141
Kanmar	96
Kannuchi	398
Kannu palle	246
Kanom	179
Kanor	94
Kanpala	205

	Pages
Kanru	17
Kansıcrı	276
Kanshım	100
Kaı sı	173
Kaı s an	315
Kanta	89
Kanta bohul	xxıv
Kaı ta golı batana	386
Ka tı lal batana	389
Kaı talu	219
Kanta clı	165
Kanta s ngar	389
Kantena	240
Kanthal	329
Kaı than	315
Kaı tıan	166
Kantjer	350
Kanu	60
Kanujera pattıa	160
Kanukpa	60
Kanup la	245
Kanuwan	xxv
Kan va l	91
Kan vál	307 311
Ka nway	282
Kanyın	32 33
Kany n kok	32
Kany n nee	31 32
Kanyın pyoo	33
Kany n wettoung	31
Kanyoung	31
Kanyu	309
Kanyúr	264
Ka zal	100 101
Kanzla	100
Kao	258
Kapa lah	418
Kapasi	49 390
Kapl al	391
Kapl thı	325
Kap la	361
Kaplı	361
Kappalı	246
Kap p ra	272
K puı ru	234
Kapua kanwál	308
Kapyau g	176
K ra	269
Kar da	358
Kara l pongan	93
Karaı	40
Kara l	430
Karaka	47 180
Karalla	367
Karallı	177 140
Karallu	158
Karam	290
Kara nb	2 2
Kara ul ru	158
Karambu	257
Karanga	104
Kara gal	136
Karangallı	153
Karangı	142 228
Karanj	133
Karanja	133
Karanjel	342
Karanjelo	276
Karanjı	342 158
Karanta	265
Karaı uchı	296
Karapu kongıham	68
Karaput	82
Karar	140
Karasnı	397
Karassı	255
Karatoverıy	49
Karaun la	261
Karaunjı	vı
Karaway	306 307
Karbaru	210
Ka channa	327
Karchı	143 263
Karch a	255
Kardahı	187
Karé	226 297
Karedha	180
Kareı	206
Karekaı	261
Karemara	251
Karendera	100
Karepak	61
Karer	165 160
Karera	397
Kargnal a	357
Karhár	227 278
Karı	310 263 9 351 15
Karı basrı	334
Kar bevu	ıx
Kar gl eru	111
Kar ka	xxvı
Karıl	15
Karımma	19
Karı mattı	182
Kar mutal	119
Karındı	305
Kar nga	228
Karıngı	263 264
Karipal	230
Karır	152
Karı vepa	61 ıx
Kark	430
Karka	180 356
Karkacha	136
Karkanna	89
Karkan e	240
Karkap lly	115
Karkava	87
Karkaya	183
Karkl a r	153
Karkı	261
Karkotta	3
Kárla	393
Karu ıı	139
Karu ora	210
Karmaj	xvıı
Karnaliya	217
Karo	158
Karolu	159
Karra	158 203
Karrai	46
Karralura	15
Karra marda	182
Karram jowa	26
Karrevembu	67
Karrı	10
Karrıjalı	151
Karr l	298
Karrona	261
Karru va	305
Karsepak	ıx
Karsh	383
Karsh ı	382
Karsúı	382
Karuk	239 271
Karu maruthu	182
Karun	84, 398
Karunda	261
Karuntı umbı	219
Karupale	853
Karur	92 210
Karuvage	158
Karuvelum	151
Karvaghe	158
Karvıla	15
Karwaı	224
Karwan	15
Karwanth	11
Karwat	332
Karzu	382
Kasamar	xxvıı
Kasaragaddı	269
Kasaraka	269
Kashı	356
Kash endung	385
Kasl orón	388
Kasl mal	13
Kashmala	110
Kasl tı	398
Kasl yem	166
Kası	121
Kasír	160 212
Kaskúsrı	53
Kasmal	13
Kasmır	336
Kasmol	212
Kaso lı	14
Kasrekan	310
Kasreto	332
Kásrıke	316
Kasru	382
Kassamar	295
Ka seı	356
Kassı	356
Kassœ	339
Kassumar	95
Kasul	54
Kasúr	29
Kasurı	85
Kasyapála	42
Kataburrıa	431
Kataı	18
Kata a	343
Katail	[illegible]
Katanla	[illegible]
Katakamu	[illegible]
Katakucl l	[illegible]
Kat allurı	[illegible]

	Pages.
Katambal	303
Kat ambolam	113
Katan	42
Katanga	xxx
Katangai	xii
Katarali	262
Katári	18, 168
Katat	15
Kat-bél	62
Kat-ber	90
Kat bhewal	53
Katbhilawa	109
Kat dhaura	200
Katerni	15, ii
Kateru	82
Katgularia	340
Katguli	376
Kath	281
Kathai	64
Kathal	329
Katha-paharia	83
Kath-bel	62
Katheik	122
Kathera	206
Kathgúlar	339
Kathi	20, 116, 117
Kathitka	52
Kath-jahi	231
Kathuniar	343
Kati	117
Katiain	356
Katiang	121
Katien	18
Katil	226
Katila	46
Katillipi	243
Kat illupi	244
Katior	47
Katira	46, 376
Katiri	46
Katiwadur	428
Kat kumla	360
Katkaranj	135
Kat maá	109, 113
Kat malti	274
Katman	xviii
Kat marra	310
Katmauli	xviii
Katmedh	310
Katmoria	310
Katmowa	351
Katnim	61
Katonda	214
Katong	420
Katongzu	71
Katonj	389
Katori	11
Katpira	348
Katrain	92
Katrar	155
Kats	117
Katseori	44
Katsirsa	129
Katta Kaala	356
Kattang	428
Kattawa	18
Katti	17, 18
Kattimandu	368
Kattra	139
Kattu-bodde	42
Kattu elupay	179
Kat turanji	160
Katu andara	152
Katu-imbúl	44
Katúl	226, 227
Katúla	67
Katumer	340
Katu puveras	68
Katúr	108
Katús	67
Kat vage	157
Kat vaghe	156
Katyalu	62
Kau	194, 258
Kauka	430
Kaukonda	279
Kaula	82
Kauli	92, 407
Kaunki	106
Kaur	14, 301
Kaura	263
Kaurak	320
Kaurchi	128
Kauregu	18
Kaúri	100, 301
Kauri-jal	259
Kaurio	226
Kauri van	259
Kavanchi	49
Kavit	62
Kawahuruni	145
Kawal	308
Kawala	308
Kawat	59, 62
Kawili	45
Kayan	368
Kaymone	28
Kayoung-wa	429
Kayu	232
Kayugaru	316
Kayu-lakka	124
Kazu	323
Kchai tun	231
Kea	425
Kea kanta	425
Keeta	xxx
Kégu	237
Keharsu	383
Kehimu	256
Keim	222
Kein	355
Keindu	251
Keint	168
Kekeda	110
Kekkeda	67
Kekra	67
Kékur	x
Kelialota	133
Keli-Kadam	220
Kelmang	400
Kelu	400
Kema kechoong	238
Kemma	194
Kempú gandagheri	78
Kempugéru	108
Kému	237
Kend	249
Kenda keri	xxv
Kendhu	249, 251
Kendu	249, 252
Kengwa	429
Kentki	280
Keol	334
Keoli	400
Keonge	vii
Keor	264
Keori	425
Keowra	205
Kerak	425
Kerasya	162
Kerauli	310
Kerendo kuli	xxv
Kerguili	xxix
Keri	14, 258, 323
Kering	275
Kerra	269
Kesseru	209
Keti	124
Kettekale	xxviii
Ketuki	425
Keura	425
Keurkanta	425
Kewan	49
Keyngee	310
Kyetyo	298
Khabar	334, 335
Khabara	338
Khaboung	269, 425
Khair	148, 153
Khairchampa	260
Khairwal	140
Khaja	356, 357
Khaji	419
Khajir	168
Khajur	419
Khajuri	419
Khaksi	345
Khalsi	241
Khamara	359
Khammara	295
Khanda	394
Khaniára	165
Khanna	394
Khansing	100
Khaoi	345
Khaoung gyee	299
Khar	147
Kharai	87
Kharak	343
Kharaka	xxviii
Kharani	254
Kharanja	383
Kharaoli	327
Kharas	102
Khardhawa	185
Kharenirri	383
Khareu	382
Kharhar	xxiii

Pages		Pages		Pages
Kháridjar 259	Khutrau 407	Kirmoli 99
Khariz 1"1	Khwa ral 140	K rna 10
Kharkath 275	Khwairalo 140	Kirnelli 391
Kharlei 20	Khwan 258	Kironli 25
Kharmo 216	Kl wangere 300	Kirpa 178
Kharmuch 166	Khyee poung 319	Kirra 263 2"4
Kharot 39?	Kiahong 110	K rrari 176
Kharpat 67	K am 263	Kirri makalu 367
Kl arrei 9	K am l 110	Kirru 174
Kharsani 169	K amoni 194	Kirsahar 255
Kharsing 279	Kiár 136	Kírsel 278
Kharsoni 305	K ch ge 12?	Kisl u" 361
Khurwala 3"6	K erpa 177	Kisi 28
Khasaroa 345	Kibay 316	Kisri 16
Kl asea 269	Kihur 356	K ssi 30
Khatip 214	Kikar 150 151	K tehli 59
Khattimal 303	K kra 306	Kithu 168
Khau 258	K kri 165	Kitla 98
Khauta 88	Kilai 158	Kitola 136
Kl awari xvii	K lar 174 400	Kitoli 136
Khaya 245 280	K launta 408	I ittali 59
Khejra 147	Kilawa 264	Kittul 4"0
Khenti 117	K lei 400	Kit váli 136
Kheri 148	K levay 66	Kiwach 121
Khe sari 255	Kili 158	Kjera 310
Khesa 206	Kil ugi 135	Klandru 4
Khesla 54	Kilok xv	Klenchu 166
Kl eu 110	K lonj 383	Kl unti 216
Khewnau 339	K lu 100 407 418	Knár 263
Khimor 214	K lmich 214 215	Ko 258
Kh n 150	K lmira 67	Koámil 391
Khína henda 367	Kilmora 12	Koán 19
Khi am 79	K lp ttai 98	Koaya 190
Kh nna 367	K lpattar 101	Kobb ri 422
Kh uni 200	Ki nbu 328	Kobusi 391
Khip 266	I mri 333	Kocham 95
Kh r 216	K mu 328	Kochan 204 212
Kh ri 246 264	Ki nul 110	Koda 2"2
Kh shing 79	Kindal 18?	Kodaga 2"3
Kho ra 153	Kingalun 279	Kodarsi 354
Kho ru 153 154	Kingaro 87	Kodi 216
Kl oja 282	Kinghena 422	Kodo 282
Kl ola ruis 3"4	K ngi 3 3	Kodum 220
Kl ootai i 16	Kingli 148	Kodwari 110
Khoozan 225	K ni 158	Kogar 263
Khor 150	Kinjal 182	Koha 184
Kl oskadumar 310	Kinjolo 19"	Koham 95
Kl o ingyan 42	Kinko t 428	Koh beng 142
Khour 153	Ki ni 158	Kol i 356 3"3
Kl owsey 47	Kin pa l n 319 350	Kol ka 111
Khreik 112	Kint n 305	Kohú 258
Kl ud u jamb 319	Kinúrlur 42	Kol umba 69
Kh ilen 312	K och 84	Ko ki pura 94
Khum 216	Kip 266	Ko la mukri "64
Kl umb 58	Kiral 15	Ko lari 140
Khumbi 197	K ralboghi 40	Ko r 153
Kl ur 4"1	Kiran 354	Ko ral 110
Kl ura dumúr 332	Kiranelli viii	Kokan 204
Khurasli 255	Kirballi 21	Kokan ber 85
Kl urhur 339	Kiri 255	Kokat o 23
Kl uri 315	Kirin lur 22	Kokhari 239
Kl imari 2"8	Kiriwalla 263	Koki 181
Khurj hendra 2 8	Kirkiria 30"	Kokkita 2"8
Kl urrur 258	Kirni 263	Koko 103
Kl isam 393	Kirnia 325	Koko-aru 81
Khúshiu 2JJ	Kirmira 59	Kokoh 167

Kokoranj 185
Kokra 312, 355
Koku 260, 261
Kokum 22
Kokúrsida vii
Kokwa 430
Kolain 396
Kolamava 108
Kolan 396
Koláru 143
Koli 257
Koliár 140
Koliari 140
Koli kuki 354
Ko lon 396
Ko long 220
Kómba xxiii
Komi 226
Komur 95
Konay 136
Konda-amadum 318
Konda chiragu 160
Kondakashinda 61
Konda mamidi 66
Konda manga 228
Konda mávu 66
Kondapatti 43
Konda tangedu 148
Konda vaghe 158
Kondricam 41
Kone 136
Konca-dumbar 340
Kone kathit 121
Kong 17, 40
Kongiliam 17, 67
Kongki 111, 163
Kongnyin-nway 145
Kongora xviii
Konhaiah 309
Koniari x
Konikath 390
Koniúnchi 398
Konkúdú 96
Konso xxiii
Konto palás iii
Konya xxix
Kooail 344, 345
Kooupymmah 203
Kopadalli 240
Kopar 430
Kopásia 43
Kora 263
Korakbet 423
Koramadi 356
Koramau 356
Koranjú 133
Korchi 354
Koreh 340
Korgi 230
Kori 230
Koria 351
Kori-buta 49
Korinta 155
Koriti 327
Korivi 93
Kor-jam 194
Korkoria xxvi
Korkot i
Korkotta i
Koroh 34
Koroi 158
Korra 269
Korsa 355
Korshe 358
Korsi 358
Kosh 373
Kosi 356
Kosrú 103
Kosum 95
Kosúndra 139
Kot 300
Kota gandhal 230
Kota ku 229
Kotang xxviii
Kota-ranga 229
Koto 428
Kotoloah 304
Kotur 389
Kouatch 121
Koungmboo 34
Kowa 184
Kowal 373, 392
Kowti 16
Koyam 142
Kozo 282
Kraipang 423
Kramal 379
Krambal 379
Krammal 379
Krapchi 332
Kraunti 216
Krawru 298
Kreu 382
Krim 263
Kring 423
Kripa 178
Krishna-chúra 135
Krok 407
Kroma 308
Krot 392
Krowai 305
Krowee 133
Krúi 382
Krumbal 339
Krún 163
Krusbal 162
Ku 168
Kuá xix
Kúar 263
Kuay 227
Kuayral 141
Kuberakashi 278
Kubinde 42, 43, 50
Kub-tolia 282
Kuchan 394
Kuchila 269, xxvi
Kuchla 269
Kuchni 91
Kuda xx
Kúdar 46
Kudia xxiv
Kudrom 408
Kuja 255
Kujarra 269
Kuji 166
Kujitekra 177
Kujúri xiii
Kujya xii
Kukai 17
Kukar 67
Kukei 91
Kúkúra chúra 231
Kukur chita 310
Kúkúr kat 224
Kúl 88
Kulain 172
Kula marsal xxvii
Kulara 215
Kulejera xxix
Kuli 295, xxix
Kullai 431
Kulla-kith 339
Kull-ponne 26
Kullu 419
Kulluk 428
Kúlú 46
Kulyatzo 46
Kúm 92, 221, 256, xxi
Kumala 361
Kumanta 377
Kúmar 295
Kumara 307
Kumarpulki 187
Kúmba 342
Kúmbal 393
Kúmbay 229
Kumbh 197
Kumbhi 17, 271, 197, 228
Kúmbúk 183
Kumbúl xix
Kumbulu 295
Kúmbuten 234
Kumbyúng 350
Kumila 361
Kum-jameva 253
Kumki 215
Kúmkoi 221
Kúmkúm xxiii
Kúmkúma 361
Kúmla 15
Kumla nebu 59
Kummar 341
Kúm paiman 271
Kumra 222
Kumri 197
Kumringah 196
Kúmsúm 344
Kumta 150
Kumtia 150
Kún 116
Kúnachi 166
Kúnch 215
Kunda 255
Kundapula 139
Kundaru xix
Kúndash 373
Kúndrikam 66
Kundrudi 231

	Pages
Kundı	147
Kundol	xvii xx
Kundoung	340
Kúndur	66
Kúndura	66
Kunggong	134
Kungku	85
Kunglı	66
Kung kung	239
Kunl ıp	338
Kunıa	339
Kunj	342
Ku jılt	266
Kunjanalı	342
Kunjı	92 vı
Kunkır kola	95
Kunku	84
Kunlaı	148
Kunrat	148
Kunsa	373
Kun un~	55
Kuppa manhala	16
Kura	86 263
Kuragumangjal	16
Kur ıkat	263
Kural	140 141
Kurau g	266
Kurat	230
Kurebı	xxvi
Kures	124
Kurı	210 254
Kurıa	xxvi
Kurkuı	319
Kurku	361
Kurkuı	211
Kurkuna	272
Kurkun ber	89
Kurkutı	418
Kurl nga	237
Kurma	308
Kurmalı	216
Kurmang	xviii
Kurmı	220
Kurmru	159
Kurong	xxix
Kurpa	93 196 199
Kurpod ır	81
Kurol	210
Kurpoora maram	188
Kurra	263
Kurrera	3_3
Kurse	295
Kursı	225
Kursunla	218
Kurtı	xxix
Kurucl pat	418
Kuru l	418
Kuruk	67, 78
Kuruml a	xxiii
Kuruuna	201
Kurzatı	83
Kush	162
Kusl arta	252
Kushu	168
Kusı	252 357
Kusturı	150

	Pages
Kusumb	95
Kutebı	222
Kutı	xxvi
Kutılal	315
Kutkı	50
Kutsaı	215
Kutugerı	112
Kuve	ıv
Kwam lın nek	495
Kwam-thee beng	491
Kwaydouk	83
Kway n vay	88
Kway tanyeng	118 145
Kweı	427
Kwer	255
Kwıa	166
Kwıala	166
Kwıl ar	140
Kwıll m	215
Kyadoo	16
Kya eng	32
Kyaı beng	196
Kyaıgyee	71 196
Kyaınee	196
Kyaıtha	196
Kya kat wa	428
Kyan loo	25
Kyansa	389
Kyanya	388
Kya thoungwa	427
Kyeınguee	424
Kyeksu	363
Kyellowa	428
Kyenbankyen	493
Kyenbot	425
Kyeugtha	423
Kyetmouk	97
Kyet yoh	297
Kyıngbı	325
Kyıukı	323
Kyontı	xıv
Kyoo	181
Kyou	249
Kyoungchet	134
Kyoungdouk	279
Kyoungmee koo	266
Kyo ıngyabeng	275
Kyoungyet nway	134
Kyun	283
Kyunnal n	294
Kywotnay nway	185

L

	Pages
Laba	xviii
Labanu	66
Laber	120
Labshı	78
La lurı	254
Lagl uno	315
Lal ın	61
Labokung	123
Lal úra	275
Laı	1
Laı ler	vıı
Laı lont	ıv
Laıgongron	ı xv
Laıkezau	363
Laıla	375
La loo	81
Laınja	206
Laıphanzeh	304
Laıza	204
Lajuk	148
Lajwantı	148
Lakl ar	106
Laker konta	xııı
Lakkı	297
Lal orı	273
Lakrıkat	353
Lakshmı am	108
Lakuch	330
Laku chamma	330
Lal champ	5
Lal chandan	131, 254
L l chunı	25
Lal daıro	200
Lal dhuna	38
Lal guras	236
Lalı	308 xıx
Lal jhau	19
Lal kabashı	99
Lal kaınjal	367
Lal koı ı ura	97
Lalla	352
Lalleı	160
Lal mallata	363
Lal sır s	159
Lal tıımalıya	214
Lal totılla	209
Lamboben	109
Lambrun	3
Lamkaı a	356
Lamma	xvııı
Lammar	293
Lamote	107
Lampat a	204
Lamslung	308
Lanang	93
Landar	253
Lanebar	266
Langshur	111
Langura	390
Lankasıj	368
Lao	19
Laokrı	xıx
Laıa ng	44
Lapı	342
Lapsl ı	70
Lasmanı	59
Lasora	270
Lasrın	158
Lass rı	270
Lastuk	334
Lasunı	83
Laswara	270
Lat	4_3
Lateeku	354
Latıkat	351 352 3 3
Latı mahwa	69
Latkan	16
Latman	302

	Pages.
Latmi	73
Laur	101
Lauri kassamar	271
Lawúlú	242
Leauri	410
Leddil	308
Ledra	367
Lehtia	118
Lei	19, 86
Leila	256
Leinben	179, 182
Leinga	19
Leinja	310
Leja	310
Lelar	171
Lelka	339
Lémé	424
Lendi	201
Lendwa	367
Lendya	200, 201
Lepchaphal	308
Lersima	vii
Lesú	336
Lesuri	270
Letkop	45
Letpan	44
Let-top	262
Let-touk	33
Lettoukgyee	263
Lettouk thein	264
Lewar	411, 412
Lhijo	168
Li	168
Liai	271
Liar	271
Lihúng	xx
Lijai	425
Likh-aru	163
Likh paieli	309
Likúng	161
Lilima	356
Lím	78, 398
Limb	69
Limbara	69
Limbarra	70
Limbo	69
Limbyún	3
Limshing	398
Limtoa	349
Lin	171
Lingyau	2, 4
Linhlún	367
Lipiah	325
Lipic	325
Litchi	97
Liú	168
Liur	412
Líwar	168
Lmanza	400
Lóa	xxviii
Loajam	59
Loda	351
Lodh	253, 254, xxv
Lodh bholia	253
Lohagasi	x
Lohar bhadi	110
Lohari	251
Lohása	106
Lohéro	275
Lohúri	275
Loj	253
Loja	253
Lokandi	91, 230
Lokaneli	93
Lolagu	50
Lolti	256
Lolú	270
Lonepho	109
Longarbi thiras	298
Longsoma	268
Loodooma	12
Loolengkyau	305
Losh	253
Lota	431
Lota amari	73
Lowa	33
Lú	253
Lúar	275
Luban	66
Lubbor	209
Lúd	78
Ludum	xxv
Luki	298
Lukunah	299
Lúni	171
Lún	171
Lúna	9
Lunu-ankenda	60
Lúnú-madala	278
Lupúng	xx
Lúrjúr	206
Lúst	413
Lutco	354
Luti-am	260
Lutki	199
Lutter	330

M.

	Pages.
Maá	107
Machalla	61
Machil	3
Machugan	361
Mada	176, 299
Madaewah	427
Madagari vembu	76
Madagiri vembu	xii
Madanay	59
Madar	122, 265
Madara	121, 358
Madare	349
Madat	183
Madateya	146
Madai	182, 184
Madge	183
Madi	428
Madlatah	356
Madling	135
Madmalti	58
Madmandi	263
Madúbúlúta	58
Maduga	121
Madu karray	227
Magadam	245
Magar	428
Magkal	379
Magsher	376
Magyee	142
Mahadan	194
Mahahlayka phyoo	138
Mahaka	63
Mahal	379
Mahalan	139
Mahalay kani	140
Maha limbo	70
Mahalimbu	78
Maha ním	78, x
Maha-núga	333
Maha ratambala	230
Maharukh	64
Maharut	67
Mahkoa	xiv, xxviii
Mahlbans	427
Mahlu	427
Mahlun	78
Mahoka	180
Mahow	43
Mahu	243
Mahúa	393, 243
Mahúla	243
Mahúr	266
Mahwa	243
Mai	20
Maida	310
Maidal	226, 227
Maidal-lara	327
Maika	x
Mail	91
Maila	169, 297
Maimúna	92
Main	76, 227
Mainakat	208
Mainakat lara	327
Mainhúri	227
Mainphal	227
Maiu-lok	340
Maizalee	138
Majee bouk	228
Majnun	376
Makai	89, v
Makanchi	282
Makaním	70
Makar-tendi	251
Makay	61
Makhi	351
Makhur	62
Makkal	378, 379
Makkam	255
Makki	24
Makkúna	139
Makola	113
Makreru	339
Makriah chilauni	29
Makshári	341
Makshéri	372
Maku	389
Makúlú	16

Pages

Mak ır kendı 2o2
Makusal 29
Mal 378
Mala 122
Malahcota 97
Malakabeng 190
Malampongu 23
Mala konjı 4?
Mala ng 327
Malan 116
Mal burute 77
Malebang 377
Mald t 67
M ldu g 341
Malegeru 3
Malet 299
Malghan 139
Malı 78 2?8 2oo
Mal ng 4?6
Maljan 139
Malkaknı 86
Malkangonı 87
Malkarr 217
Malla 87
Malla manjı 425
Mallalı 2o1 278
Mallata 363
Malla ním 70
Mallay 27
Mallaykone 13o
Mallaytanak 224
Mallay vembu 70
Malle nerale 193
Mall g rı 306
Mall kaphal 255
Malmur ya 239
Malo gha 303
Malu 139
Maluk ?o2
Malwa 276
Mamadı 107
Mamekh 1
Mam d 107
Mamjı 341
Mamral 91
Mamrı 8?
Mán 33? vı
Manab na ??4
Manayar 166
Mancl ı moyadı 193
Manda 2?7 3?4
Mar da ll úp 68
Mandadupa x
Mandal 121 ?36
Man lan a 13o
Mandar 100 xv
Ma larch 140
Ma lgay 218
Man lkolla 2?7
Man lei 3 4
Manderung 341
Man l a 210
Mandu 341
Ma d kum xx v
Mancl gı 2 6
Mane oga 1??

Pages

Mangarwal 394
Mangas 107
Manghatı 20?
Mangı 184
Mangıl 4?8
Man pangam 94
Man phtyol 121
Manjad 146
Manja kadımbe 2?0
Manja pavattı 23?
Manja pu 2o5
Manjat 146
Manje konne 138
Manj 341
Manj t 219
Manjunda 2?8
Manneul 227
Mannu 341
Mantet 3o7
Manthullı ı
Manu 104
Manyul 2?7
Mao 393
Maoh v
Maohla 23
Maoo ??0
Maookadoon 220
Maoolet tan sl ay 218
Mapurı bet 4?3
Mara 84
Mar ds ng 49
Maraharalu 36o
Maral 341
Maral ngam 15
Mara narulle 36o
Marangmata xxvi
Marara 1?0
Mararı 341
Marat 63
Mar tmal 236
Maratattı 16
Maravettı 16
Marazh 341
Marel ob 101
Marchula 61
Marda 310
Mard 4?0
Maredu 63
Mare la 8?
Margl ang 383
Mar gl walawa 214
Marı 333 339 4?0
Mar ngı 3?3
Marısg rı 306
Mar thondı ?00
Mark 99 356
Marka 107
Marlea 211
Marleya 361
Marl za 2 1
Marmatı 1o1
Marn 341
Marnı 34o
Maror phal 49
Marpl 1?9
Marrıa 2?o

Pages

Marrun 341
Marsadabolı 185
Martan 120
Maru 183 383
Marıl nga 15
Marwan 297
Masenda 218
Mashul lara 103
Masl ur 315
Masjot 52
Maslara 26o
Ma pat 1?1
Massei 206
M ssivára 102
Massu 4?
Masua 106
Masur baurı 3o0
Mas rı 113
Mata sure xxv ı
Mataw 23
Mataven samprání 143
Mate k ssı 12
Matela 4?7
Mathan xxx
Mathara 282
Math rshı 159
Matsola 302
Mattı 18? 2o6
Mattı pal 64
Mattranja 282
Mattu 117
Matzbang 215
Maudh 118
Maul 13? 243
Ma la 139 122
Maulan xv ı
Maulı 169
Maulser 245
Maun ?0?
Maur 383
Maura ?97
Mauraın 139
Mauru 341
Mausa 3?3
Mausa s j ?68
Mava 107
Mavena 107
Mávu 107
Mawtdá 47
May 9o
Mayan 108
Maya bo 53
Mayan ng 60 ıx
Maya rawa 240
Mayhell 169
Mayo bung 2 o
Mazrı 418
Mealum ma 3?3
Meda 310
Meda tumrı 18
Medh 310
Mee ?44
Meekvoung nway 133
Meenaban 231
Mehal 1??
Mehn lı

	Pages.
Mehul	161
Meinkara	61
Mekrap	328
Men	206
Ménda	310
Mendah	310
Mendal	276
Mendora	33
Mendru	101
Mengkop	22
Mep young	247
Meral	xxviii
Meriam	108
Merinu	341
Merlo	iii
Mer mahaul	85
Mersingh	276
Mersinghi	276
Meru	341
Mess guch	159
Metkúr	87
Metunga	429
Mewri	297
Mezenkuri	309
Mhaner	228
Mhani ben	226
Mhanpyoo	226
Mhár	420
Mhow	332
Michamma	33
Michapgong	294
Michapnok	293
Micha-tummurra	251
Michepnor	19
Middi	294
Mihul	167
Mijhaula	317
Mililla	297
Milkaranai	61
Milkisse	13
Milli	352
Mimarari	92
Mimri	225
Minbo	420
Mindla	227
Mindri	357
Mingu	317
Mini	344
Mipak	xiii
Mipitmúk	123
Mirandu	87
Mirchi	3
Miri	xiv
Mirianga	275
Mirri	398
Mishmish	162
Mithidiár	260
Mithivan	260
Mitenga	427
Mith-patta	308
Mitli	327
Moakurra	80
Moal	33
Moat soom	253
Mochi	122
Mochooma	420
Modagerri vembu	355
Modala	363
Modhuriam	190
Modugu	122, 123
Mogali	232
Mogalinga	255
Mogasong	310
Mogul	vii
Moha	243
Mohani	299
Mohi	67
Mohin	110
Mohna	xxiii
Moho	243
Mohtu	123
Mohúl	xxiv
Moi	110, xv
Moja	110
Moka	255
Moka-yapa	278
Mokha	255
Mokkak	255
Mokol	255
Mol	168
Momakha	364, 376
Moman-tha	357
Mom-china	366
Monda	xxix
Mongtain	415
Mong-taing	86
Mong thel	364
Moni	299
Monkakrik	293
Monkyourik	2, 240
Moola	47
Moondein	85, 86
Moonemal	245
Moong	252
Moqchini	210
Mora	297
Morada	66
Mora	297
Morada	66
Moráun	297
Mored	341
Morhal	33
Mori	83
Morinda	407
Mor kurangi	59
Morli	109
Moroi	158
Morphal	169
Morre	97
Moru	383, xvi
Morúa	235
Morún	341
Morunga	114
Morungi	323
Moshungon	vi
Mosonea	272
Mossé	51
Mota bondara	202
Mota karmal	2
Motha	120
Moukshow	207, 128
Moung-zebri	193
Mouricou	122
Mowa	266, 243, 351, 393
Mowen	110
Mowhitta	133
Moydi	339
Moye	110
Moyen	110, 219
Mroung-shisha	67
Muchi tanki	251
Mudah	65
Mudanu	377
Mudár	265
Mudla	257
Múdúdad	77
Mudu kaiyeya	425
Mugali	245
Mugalik	425
Mugila	99
Mugli	150
Múgra	255
Muhli	70
Mukampala	262
Mukial	427
Mukta maya	96
Mula	122
Mulaka	114
Mulgia	xvi
Múli	429
Múlili	9
Mulin	275
Mullúta	280
Mulsári	245
Mulu modugu	121
Mulu-vengay	356
Munasi	82
Munda dhup	41
Mundi	222
Mundiri	108
Muneti	173
Múnga	114
Muni	121
Munigha	114
Munnay	295
Munri	215
Murada	183
Murahara	425
Murari	118
Múrba	425
Murgali	425
Murgut	102
Muriá	109, xxvii
Muri muri	vii
Murkalu	109
Murkitumma	150
Murki malle	81
Murkut	206
Murmutti	150
Murr	123
Múrrd	xvi
Múrt	120
Murtenga	67
Muruká	122
Murut	xvii
Muruto	202
Mús	49, vii
Musadi	269

Pages

Mushk ara 13
M sl to 269
Muskei 219
M sl nd 304
Musl n 45
Musre katus 389
Muss 190
M tkar 349
Mutni 91
M tta 350
Muttuga 193
Mutw nda 314
Mya 167
Myablay 255
Myah se k 339
Mya naban 280
Myat ya 53
Myeng kabeng 144
Myetpyau 199
Myinwa 430
Myla li 297
Myooma 426
Myoosay 497
Myouk gnau 204
Myouklouk 330
Myoukopshit 83
Myoukse t 342
Myouksl aw 207
Myrole 297

N

Ná 27
Nabbay 110
Nachal xxix
Naga 84 194, 233
Nagabetl a 495
Naga do a 233
Naga golal et 493
Naga golunga 61
N ga kesara 97
Nagal 294
Nag san j gi 2
N g el a npa 2
Nagdana 233
Nagdaun 101
Nagesar 2
Nage l voro 2
Nagetta 28
Nagp t 109
Na j l ana 208
Nagpl ans 208
Nagjût 139
Nagre 196
Naguwn 17 18
Nagyee 50
Nal a 315
Nal or 27
Nal sher iv
Na bela 159 vi
Na nd 194
Na rari 194
Nal t k 3
Nai ud 278

Naiw lli 139
Nâk 168
Nakhtar 396 400
Nal ka naregu 18
Nakka renu 330
Nakkera 270
Nakouli xx i
Nakul 9
Nal 498
Nala t e 133
Nalavail 133
Nalb la 69
Nal 349
Nalkaru 217
Nalla balsu 230
Nalla duduga 9
Nallaika 296
Nalla l al sha 296
Nalla mada 299
Nallarenga 160
Nalla sandra 153
Nalli 352
Nal shuna 272
Nal valanga 198
Nambyong 398
Namla g 427
Naml 342
Namme 185
Na n paputa 31
Na a 201
Nanah 202
Nanbhantur 350
N ncha 96
Nanda 356
Nandi 201 202
Na d ki 57
Nang 27 212
Nangal 27
Na ghe 173
Na j nda 65
Nantayop 175
Nanu w ti 393
Naoru 294
Nar 91
Narala 194
Narangi 59
Nara j 368
Nar botku 50
Narel 1 2
Nareyr 194
Narguni x
Nari kadam 192
Nar kel 422
Naringi 59
Nariyal 492
Narki 311
Narlei 20
Narl ngi 160
Nâro 206
Narockpa 68
Narole 65
Narra 272
Narra alagi 310
Narri 490
Narv ll 271
Narvej 143

Nas bel xv i
Na edu 194
Nashpati 168
Nask 15 ii
Nasut 121
Nata 135
Natkana i i
Natkanta 59
Natin 73
Natushengote 111
Nat va lom 18
Nauk di 297
Naura 294
N val 194
Navil 342
Navvel 194
Na val 193
Nawar 194
Neb 69
Nebede 60
Neckame 230
Nee x i
Neemeeri 182
Nehar 61
Nekota 93
Nelkar 124
Nella je l 111
Nellama ldi 247
Nella ma lu 182
Nella purududu 353
Nella tuma 151
Nella ul m ra 218
Nellekai 352
Nelli 201 352
Nelmal 268
Nengar 297
Nepalam 365
Nepora 4 0
Ner 61
Nera 235
Neradi 87
Nerale 194
Neri 90
Ner n la 363
Nerrelu 87
Netav l 332
Neva ledi 238
Neverra 340
Ne ar 85
Ne varpati 266
Newr ng 368
Ngapl voo 14
Ngoomee 137
Ngraem 1 9
Ngraem rik 155
Nl are 413
Nia jowa x
Nian ha 173
N bari 251
N el n rattankát 235
N chak 317
N al 495
N ggi 219 315
N kari 358
N kki lekkar 55
N kki ka l r 11

Pages.

Nikki kúrkan . . . 391
Níl 117
Nila 102
Nilay 55
Nilbhadi . . . 67
Nilika 352
Nilli 352
Nilpitcha . . . 229
Nilure 66
Nín 69
Nimat 270
Nimbar . . . 152
Nimbarra . . . 70
Nimbay . . . 69
Nimda 266
Nimi chambeli . . 274
Ním pooteli . . . 361
Nimuri . . . 69
Ninai 248
Nior 91
Niral 273
Nirambali . . . 414
Nirangi . . . 134
Niranji . . . 376
Nirása xxi
Nir-chappay . . 318
Nirgal 426
Nirgiri 297
Nirgudi . . . 297
Nirgunda . . . 297
Nirgur . . . 297
Nirija 87
Nírjíluza . . . 119
Nirkadambo . . . 222
Nir-mali . . . 268
Nir-nochi . . . 296
Nirpa 141
Nir pongilam . . 276
Niru 87
Nirujani . . . iii
Nirvála 15
Nishinda . . . 296
Nisinda . . . 297
Nisur 87
Niú . . . 166, 373
Noaluta . . . 133
Nogo 78
Nomorchi . . . 12
Noona 232
Nori 351
Nowli cragu . . . 297
Nozarái . . . 418
Núch . . . 411, 256
Nuggee . . . 114
Number . . . 199
Numbong . . . 361
Numboongkor . . 362
Numbor . . . 295
Numingrik . . . 165
Numma . . . 186
Numro . . . 363
Nunewalai . . . 103
Nuni 328
Nuniajhar . . . 308
Nuniári . . . 350
Núni-papúta . . 231
Nupsor . 305, 306, 312
Nuskul 109
Nwahmi . . . 316
Nwaleinbyeng . . 60
Nwaycho . . . 280
Nwaysat . . . 282
Nyái 173
Nyau 232
Nyaw-chah . . . 316
Nyoungbandi . . 335
Nyoungben . . . 332
Nyoungchin . . . 334
Nyoung-kyap . 268, 332
Nyounzop . . . 336
Nyoungpyoo . . . 335
Nyoungthabyeh . . 336

O.

Oao i
Odasalo . . . 150
Odela 46
Odla 46
Oö 160
Ohalu 352
Oi 160
Oit-bulung . . . vii
Oka 421
O kaiyeya . . . 425
Okhoungza . . . 73
Okhyang . . . 73
Okshit 63
Olchi 162
Omak 46
Ombu 20
Omé i
Omra 47
Ong 422
Ooh 420
Ooluchakma . . . 386
Oosulay . . . 160
Opa 259
Opang 344
Opnai 327
Ora 428
Orasmaro . . . 415
Orcha 205
Orer 363
Oru 42
Osai 298
Oserwa ii
Osirka 352
Otengah . . . 2
Ouk-chingza . . 250
Ouk-mouk . . . 362
Oulia champ . . 6
Ouli gogen . . 29, iv
Ovalli 245

P.

Paán 104
Pabba 76
Pábdá 203
Pábe 379
Pabúna . . . 341
Pachakathalai . . 426
Pachári . . . 129
Pachimanu . . . 186
Pachunda . . . 15
Pád 372
Pádá 79
Padám . . . 412
Padar . . . 278
Padari . . . 278
Padaria . . . 278
Paddam . . . 163, x
Padebiri . . . 219
Padenarayan . . 134
Pader 278
Padera . . . 219, 231
Pádiálá . . . 278
Padmak . . . 412
Padouk . . . 130
Padri . . . 129, 278
Padrián . . . 140
Padriún . . . 87
Padul 278
Padurni . . . 278
Paghala . . . 255
Pagjiok . . . 431
Pagun 44
Pahar 18
Pahar gúngri . . 116
Pahariçha . . . 239
Paharipipal . . . 379
Pahar lampati . . 242
Paia 431
Paidi 339
Paieli 312
Pailae 197
Paiman 194
Paini 41
Paini mara . . . 41
Pair 335
Paisigong . . . 123
Paja 163
Pajerra . . . 113
Pájia 163
Pajpati . . . 296
Pákar . . . 334, 335
Pakh 379
Pakha 418
Pakhána . . . 165
Pákhar . . . 334
Pakhori . . . 425
Pakhshu . . . 379
Pákhur . . . 216
Pakki-túma . . . 149
Pakjik 432
Pakki 327
Pakpa 431
Pakri . . . 334, 335
Paktawar . . . 215
Paku 421
Pakúra . . . 254
Pálá 169, 241, 262, 263, 264
Palagaruda . . . 262
Palai 105
Palák 335

	Pages
Palakh	334
Palamkat	177
Palás	123
Palási	123
Palashu	xvii
Palati	304, xxvi
Palava	245
Palawa	23
Paldatám	272
Paldua	xvi
Palé	99
Palegnyok	99
Palet	211
Palita mandar	122
Paliwára	122
Palkai	339
Palkurwan	264
Palla	246
Pallam	264
Palla pandu	246
Palle palo	246
Palok	365
Palosa	152
Paltu	169
Palu	168, 235, 246
Palúch	379
Palúdar	400, 408
Paludúm	432
Palukajui	230
Palyok	253
Pama	411, 412
Pamania	275
Pambúrú	62
Pampana	275
Pamphunia	278
Pana	275, 416
Panam	119
Pánan	119
Panar	226
Panasa	329
Panben-nway	31
Panchi	186
Panchidung	xx
Panchman	186
Panchonta	242
Panchoti pala	242
Panchu	vi
Pand	319, 320
Pandan	278
Panden	272
Pandiki	43
Pandrai	xix
Pandri	xx, xxvi
Pandúr	220
Panelra	226
Pangah	180
Pangara	122
Pangra	121, 122, 145
Pani	330
Pania	42
Paniah	226
Paniala	17
Pani-chika	252
Panijama	376
Panisaj	185
Panizah	17

	Pages
Panjam-búl	195
Panji	227
Panjira	122
Panjra	228
Panjúle	353
Pankakro	i
Pankar	94
Panma	30
Panniabbil	229
Panniári	196
Pannie	416
Pan-noo	11
Panpui	i
Pansaura	55
Pansi	186, xx
Pantagah	23
Pantaka	25
Panthitya	33
Pantóm	93
Panugeri	270
Panwa	232
Pao	430
Paowlay	59
Papadar	xxiii
Papar	84, 133, 228, 173, 342
Paparapulia	42
Pápásh kalli	208
Pápat kalam	214
Papatta	231
Papaya	207
Páphar	229
Paphok	429
Papiri	231
Papli	91
Pápra	229, xxiii
Paprang	369
Papri	91, 239, 342, 369
Papria	310
Paralpadal	278
Param	344
Paramie	89
Parand	319
Parangi	66
Paranu	89
Parari	278
Parás	123, 163, xvii
Parash	43
Paráspipal	335
Parasu	xxix
Parbati	262
Parbik	11
Parbo	262
Parenga	103
Pareya-aúwal	278
Pargái	383
Pargín	265
Pari	11, 230
Pariára	121
Paridah	424
Parirajbar	255
Parjam	257
Paroa	339
Parokupi	359
Parolli	278
Parpalli gidda	89

	Pages
Parral	278
Parsíd	143
Parsipu	43
Parúl	278
Parúnga	383
Parur	278
Parwana	239
Pás	xxix
Pasarganni	128
Pasend	251
Pasendu	251
Páser	174
Pásh	84
Pashi	186
Pashien	431
Pa shing	430
Pashkouli	i
Pasi	186
Parsi	xvii
Paspu	220
Paspúkadambe	220
Passerganni	158
Passi	168
Passy	161
Pastuwanne	53, 54
Pat	52
Pata	11
Patagari	i
Patagrúja	226
Patakhan	170
Pataki	11, 86
Patalgani	261
Patali	255, 278
Patanga	135
Patangalia	99
Patcha	270
Patchalai	129
Patha	319, 320
Pat-hioo	426
Pathiri	278
Pathor	356, 266
Pati	431
Patichanda	305
Patigia	353
Patimil	350
Patir	63
Patira	227
Patji	353
Pat-karru	301
Patki	378
Patló katús	383, 385
Pat moro	212, 304
Pat mossu	ii
Patoia	310
Pat-phanas	331
Patrang	250
Patru-kurwan	263
Patsuru	129
Pattali	84
Pattang	135
Patta tiga	11
Pattarola	165
Pattewar	251
Patt harman	282
Patúli	278
Patunga	135

	Pages.
Patu-swa	303
Patutadi	416
Patwan	251
Pauma	30
Paunchinan	186
Paur bela	139, xviii
Páva	95
Pavella	96
Pavetti	231
Pawaing	363
Pawetta	231
Páya	163
Payála	109
Payani	41
Paya udesh	373
Payir rik	155
Payomka	208
Payong	240, 372, 429
Payongrik	102
Pe	408
Pease	418
Peheng	417
Pech	315
Pecha-da	249
Pedalli	226
Pedda	64
Pedda aré	140
Peddaboku	270
Peddachilka dúdúga	9
Pedda chintú	87
Pedda duchirram	157
Pedda eita	419
Peddagi	132
Pedda gomru	295
Pedda-kalinga	2
Pedda-kanru	18
Pedda-karinga	229
Pedda kunji	43
Pedda morali	109
Pedda-nella-kura	294
Pedda-nowli eragu	342
Pedda patseru	158
Peddapotri	43
Peddasopara	128
Pedda taraki	54
Peddi-mari	333
Pedéga	132
Pedéi	132
Pedu	64
Peduman	95
Pee	64
Peea	xv
Pee tunga	218
Pehimbia	68
Peingnai	329
Peirah	109
Pek	300
Peka	427
Pe-karakai	182
Pela	190
Pella-gumudu	350
Pendder	5
Pender	226
Pendra	226, 228
Pendre	i
Pendri	226, 228

	Pages.
Pengji	356
Penglai htan	233
Penglai-kanazo	47
Peni	215
Penlaykathit	122
Penti tadi	416
Pepa	423
Pepere	334
Pepéro	229
Pepe siman	xxx
Peralu	333
Perambai	xviii
Pera pastawane	354
Peria-cetcham	419
Perinji	207
Perinkárá	57
Persar	xvii
Pershuajelah	vi
Peru	64
Perumbe	147
Pesh	418
Peshora	174
Petakara	242
Petarkura	18
Pétó	xxiii
Pethra	411
Petisurali	200
Petta-mari	332
Pettega	220
Petthan	276, 277
Petpuria	220
Petwoon	52
Pey	64
Peyara	190
Pfis	418
Phaco singali	385
Phadupjoh	238
Phakram	344
Phaláni	194
Phalat	387
Phaldu	222, 224
Phaliant	387
Phalinda	194
Phalgataitu	278
Phalja	379
Phalsa	55
Phalsh	379
Phalwa	55
Phalwara	244
Phamlet	308, 312
Phamsikol	2
Phanás	329
Phanát	387
Phanda	228
Phandra	122
Phandra khair	153
Phane	310
Phangera	121
Phani	308
Pharad	xvi
Pharat singhali	387
Pharenda	194
Pharengala	99
Pharkatto	275
Pharonj	387
Pharra	418

	Pages.
Pharsa	54, 123, xvi
Pharsia	53, 55, 179
Pharwa	54
Phas	186
Phassi	129, 186
Phatak	372
Phaunda	194
Phedu	338
Phegran	332
Phekori bet	424
Phetra	226, 228
Phetrak	228
Phetya-kyee	323
Philku	217
Philli	103
Phillu	219
Phindák	170
Phipai	91
Phiphár	229
Phirphiri	47
Phis bekkar	300
Phlankur	93
Phlassu	379
Phober kúng	194
Phóg	303
Phok	303
Phomphli	92
Phugong	xiii
Phulahi	152
Phulamphi	213
Phulanch	173
Phulel	214, 244
Phul gogra	v
Phul hingori	56
Phulla	92
Phul-sappa	7
Phulsar	353
Phulsatti	200
Phúl-sola	119
Phulu	412
Phulwara	164, 166
Phungnyet	23
Phunphuna	xxvi
Phúpari	86
Phurpata	228
Phurz	372
Phusera	239
Phuspat	372
Phusrae	232
Phusri	310, 312
Phusri mallata	361
Phut	216
Piák	373
Piál	109, xv
Piangani	129
Piár	109
Piasal	132, 182, xvii
Piazay	235
Pichle	427
Pida	270
Piktumi	150
Pilachampa	6
Pilála	336
Pilchi	19
Pilikcha	173
Pilkhan	334, 335

	Pages		Pages		Pages
Pilla	329	Poguntig	348	Pouknway	122 123
P llar-marda	182	Pohor	304	Poukpan	119
Pilru	217	Poi	393	Poul pyoo	119
Pilru potala	59	Poi dhaula	395	Po nanga	96
P lsa	173	Pojo	xxvi	Po ingma the n	232
P lu 197 259	260	Pola	421	Prab 332 334	335
Pilugu	201	Pokoh	160	Prabba	423
P mpri	206	Poksha	310	Praong	427
Pin 271	349	Pokutt a	172	Pratshu	239
Pinári	45	Pol	422	Pri	120
Pincha	84	Po-la	43	Prin	396
Pincho	326	Polach	158	Pr st	378
Pind	419	Po lari	349	Pr ta	398
Pindàlu	226	Pollai	349	Pronchadik	12
Pindar	226	Poma	78	Prong	407
Pindi	314	Pomponia	275	Prongnok	407
Pind k	179	Pona	123	Prongzam 19 209	210
Pind kai	314	Pondám	266	Proosti	320
Pindra	296	Pong	133	Prora	208
Pindrai	408	Pongá	133	Prost	378
Pindrau	408	Pongalam	353	Prot	211
Pinekai	iv	Ponguyet	25	Pshi	431
Piney maram	41	Pongoo	26	Pu	95
Ping	144	Pon pad ra	278	Pua	393
Pingyat	170	Ponnagam	361	Pudangalli	21
Pinj	47	Ponra	v	Pu lari	219
Pinlayo ing	74	Pooalay	312	Pu l lum	361
P nlay th t-kouk	187	Poo-mardá	182	Pud kat	367
Pinlaytsee	80	Poomarum	236	Pudu	319
Pinna	244	Poon	26	Pugr ang	431
P nnai	3	Poonang	iv	Pukana	166
Pinna nelli	295	Poone	21 26	Pula 43	44
Pinnay	25	Poota tammi	197	Pulach i	95
Pinoh	46	Pooteli	311	Pulhari	139
P nri	218	Poothadah	425	Puli	142
P ntayan	55	Poovati	97	Puli ille	113
P pal	335	Popli	390	Pul patl a	43
P pli 174 334	335	Popra	xx i	Pul sl inta	139
Pipri	335	Porap i	71	Pulla dondur	150
Piralo	296	Porasan	193	Polli l agl i	158
Piri	xvii	Porasu	193	Pullung	277
Pir j-di	141	Porda	103	Pulmu	215
P roi ji	vii	Poresh	43	Pulsur	349
P sl nna	247	Por lla	139	Pulup nan myouk	318
P ss babul	150	Por s	43	Pumba lri	270
Pisul	278	Porki	89	Pummoon	406
Pita korwa	xxvi	Poros	xxvii	Pumne	390
Pitali	359	Poro d imer	xxv i	Pun	408
P tamari	218	Porponda	xxvi	Puna	25 97
P tari	360	Port a	43	Punag	361
P tl ogarkh	242	Portoho	xxi i	Punar puli	24
Pitni	89	Poruwa	230	Pu nás	25
P traj	73	Posa	398	Pun l	110
P tso	406	Posar gni	56	P ing-cha	413
P tta	200	Posh ir	74	P inu	133
Piumar	300	Posl ra	46	Punjlawai	275
P uni	398	Posong	431	P t k	179
Pi var	196	Potali	69	P inschi	177
Piyara	190	Potári	43	Punvan	272
Po	174	Potl i	301	Pur	42
Pobong	431	Poto dl amun	55	Purakoi	94
P dah	428	Potra	134	Purasa	43
Pod am	131	Potri	43	Purlo	272
P da	215	Potrum	129	Pur ong 1	418
Pod l a la	255	Potur	294	Purvea	99
Pogao	431	P uk	123	Purgur	245

Pages.

Puri singbatti . . 267
Purmiok . . . 427
Purmo 239
Puroa 361
Puroha 123
Purphiok . . . 429
Purpuray timur . . ix
Pursa 43
Pursan 272
Pursung . . . 43
Purudona . . . 69
Purúni 326
Purúsh 77
Púskú 95
Pussooah . . . xi
Pussur xi
Pustúl 413
Putájan . . . 353
Putenga . . . 357
Puter xxix
Putila xxix
Pútkiá 366
Putlinga . . . 236
Putra-jiva . . . 353
Putra-juvi . . . 338
Putri . . . xxix
Puvandi . . . 96
Puvarasam . . . 43
Puvatti . . . 95
Puvella . . . 96
Puwak 421
Puya 323
Puya udish . . . 372
Pwot-chau-beng . . 326
Pyal 109
Pya-shing . . . 267
Pyee-nyoung . . 333
Pymma . . . 202
Pymmah . . . 203
Pymmahpyoo . . 200
Pynkado . 27 141, 148

Q

Quabi-bet .
Quindah .

R

Raban .
Rabi bet .
...dat bera .
ell... .
.
.
.
.
. 2,
.
.

Pages.

Rail 408
Raila 136
Rain 246
Raini 246
Raisalla . 398, 408, 410
Rai túng . . . 104
Rájal 214
Rajáin 342
Raján 373
Rajana 230
Rajbirij . . . 136
Rajbriksh . . . 136
Raket-berár . . . 61
Rakhal 413
Rakht reora . . . 275
Raklop 363
Rakta chandan 131, 140, 146
Rakta kanchan . . 140
Rakt anglia . . . 348
Ráktapita . . . 91
Ráktchandan . . 348
Rakti 121
Ráktrúra . . . 247
Ral 148
Rama xxii
Ramánádike . . . 314
Ramani . . . 295
Ramanjir . . . 334
Rambutan . . . 97
Ram'eneidelle . . 225
Ramgúa . . . 421
Ramjani . . . 238
Ramnia . . . 170
Rampat . . . 280
Ramphal . . . i
Rámtezpat . . . 305
Ranái 84
Ranamba . . . 310
Rand 363
Randkari . . . 310
Ranel 104
Ranga 241
Rangam... . . . iii
Rang... . . . 230
Rang 301
Rang 84
...ang . . 35, 425
...ng... . . . 71
... . . . 256
... 11
... 86
...)

Pages.

Rassu-kúrúndu . . 305
Ratabanli . . . 150
Rata gogen . . . 29
Ratay 234
Raterr xx
Rat-kihiri . . . 153
Ratmanti . . . 310
Ratoo-waá . . . 137
Rattanjote . . . 59
Rattankat . . . 235
Rattu kina . . 60, viii
Raú 40, 171
Rauket 336
Rauli 311
Raundolu . . . 313
Raundra . . . 152
Rauni 361
Raúnj 152
Raúns 171
Ravi 335
Rawadan . . . 3
Razbam . . . 216
Razli 256
Re 407, 408
Rebdán 275
Rechedá . . . 146
Reddapul-mera . . 272
Reem 423
Regguti . . . 15
Regi 88
Rek 162
Reké vi
Rela 136
Relu 135
Renchilingrik . . 103
Rend 272
Reng 319
Renga . . . 88, 245
Rengha . . . 88
Rengua xxx
Renta . . . vii, xxvi
Renuja 152
Reodáun . . . 275
Reoni 361
Reoni 319
Rera 136
Reri xvi
Rerú 152
Reteon 91
Reúnja . . . xviii
Reúsh 171
Revachinni . . . 24
Rewari . . . 407, 408
Rewat 206
Reylu 136
Rha 140
...hái 407
...etsa . . .), viii
. 398
. 384
..., 398
. 407
. 310
. 384
. 214
. 377

Pages

R chh kas 213
Richuhlu 214
Ridı 2/2
Rikaling 413
R khıl 106
Rikhúl 106
Rikkan 378 379
I ikunrı 373
I ímda 40
Rimmel xııı
Pın 384
Ping 170
Ringa 152 xıv
Ringal 4°6
I ingall 4°7
Ringer 4°5
R ngrı 6ɔ
Ringyal 166
Pını 319
I inj 152 384
Rinja xvııı
Rinjal 34
P phın 425
Rís 214
R san 4°ɔ
R sıpaing 311
Rish 171
Pitha 94 96
Ritl eı 354
Rithu 84
R tı 332
I ıu 171 xxvı ı
R una 361
Rius 171
Roangching 377
Roatu ga 9ɔ
Robbay 173
Podinga 122
Rogl u 220
Rol an 76
I ohanı 152
Robı 87
Robına 76
Pol ıtuka 73
Rohni 361
Rohu 30C
I oı 407
Roır 27ɔ
I orı 27ɔ
Rola xx
Rolı 361
I omusk 91
Ro ıg 103 4°3
I oı ch ling 113
Rookattana 202
Roc m 2ɔ0
Porá xxı
Rorı 3(1
I osbang 300
I ow 408
I o vanra 121
Lorta 7C
Ruchla 212
Rudrak 57
Rudrak-sha 45
Rudrak shamba 220

Pages

Pue 4°4
Ruebee 4°4
I uen 361
Puglım 86
Puınsh 171
Rukh 19 20
Rukh baer 90
Rukhı 314
Rumbal 335 340
Rumg ıch 393
Rung xvı ı
Pungara 122
Pungbong 420
Punggong 134
Rungra 121
Rungyeong rık 90
Punısuparı 421
Runjra 152
I unool 424
Púsa 327
Rusam 95
Pussa usarekı 351
Ruta xvı
Pute xvıı
Rutok 119
Puzerap xvıı

S

Saar 410
Sacheng 179
Sadachu 54
Sa lora 183
Sıdrı 182
Sadura 184
Safed ak 265
Sıfedar 124 3°6 378
Safed champ 6
Safed ıı l 365
Safe l kabra 334
Safed kikar 152
Safed mıllata 362
Safed nyok 309
Saf d sın al 42
Sıf d sırıs 158
Sıfbyı 320
Sıfrı ám 190
Ság 283 295
S gada 9ɔ
Sagapu 224
Sıgurabatna xx
Sagdı 9ɔ
Sagun 283
Sagwan 283
Sıgwanı 283
Sah 410
Sal adu 3°7
Saha lra 323
Sahúju 182
Saherwa 254
Sal ıne 201
Sal u hıngorı 385
Saı 216, 319
Saihan 114

Pages

Saıkamebhia 166
Sa kanta 150
Saıkre xxı
Sa ıtúlmldı vıı
Saılu 4°3
Saınjan 114
Saınjı 114
Saıphra 76
Sıtu 41
Saj 38, 18°, 283
Saja 183
Sakalang 57
Sakalyıl 91
Sakena 117
Sakher 34
Sakhu 34
Sakı 379
Sakna 117
Sıkna l akna 117
Sakomsıng vıı
Sakun 20
Sıkwa 34 v
Sal 34 39 150
Sala 34
Sala dl up 396
Salaı 66
S lanker 215
Salap 261
Sale 150
Saleı 6C 180
Sale manta 3ɔ4
Salgá 66
Salhe 66
Salı 368 xxııı
Salına 100
Salla 66 396, 407
S lle 408
Salma 419
Salu 418
Salua 46
Salwa 34
Sam 330
Sama 351
Samadıra 64
Samalu xxvıı
San arı 47
Sambar 120
Samba v v
Sa nl cıng 46
Sambung 104
Sa nkoh 304
Samlı 94
Samoka 263
Sampaga pala 297
Sampenga 6
Samp ghı 6
Samj ııı 300
Samsem 255
Sams l ar xxv
Sam sundra 160
Samudra 196
Samun lar ph l 19ɔ
Sanaka lan 23 11
Sanal nga 305
Sanatosı 24
Sanatta

Pages.

Sandal . . . 256, 321
Sandan . . . 119
Sandanpipli . . . 119
Sandanivembu . . . 78
Sandapsing . . . xxv
Sandári . . . 136, 326
Sandikaya . . . xxvi
Sandi omé . . . i
Sandra . . . 153
Sanduga . . . 208
Sané . . . ii
Sangaipru . . . 112
Sangal . . . 407
Sanginphroo . . . 101
Sangji . . . 339
Sangong . . . 305
Sangraban . . . v
Sangran . . . 310
Sangri . . . 147
Sangryn . . . 112
San hessare . . . i
Sánj . . . 382
Sanjit . . . 317
Sanjna . . . 114
Sankarunda . . . 261
Sanko . . . xxiii
Sana solti . . . iii
Sanuán . . . 378
Sanoli . . . 323
Sanpalu . . . 355
Sanpatti . . . xxvi
Sansaru . . . 326
San-ta-ku . . . 321
Santi . . . 179
Sanu arkaula . . . 386
Sanu jhingni . . . 28
Sanyepang . . . 220
Saochála . . . 324
Saori . . . 118
Sapai . . . 255, 310
Saparung . . . xxv
Saphai . . . 333
Saphijirik . . . 61
Sapin . . . 396
Sapong . . . 344
Sappa . . . 5, 7
Saprung . . . xxi
Sapsha . . . 323, 324
Sara . 109, 410, 311, 408
Sarai . . . 410
Saraka . . . 109
Saral . . . 396
Saráp . . . 413
Sarapatri . . . 158
Saras . . 55, 124, 411
Sarawan . . . 106
Sarbashtai . . . 165
Sare gogen . . . 29
Sarei . . . 34, 407
Sargi . . . v
Saring . . . xxx
Sarjuni . . . v
Sarngar . . . 237
Saroli . . . 373
Sarota . . . 67
Sarputtia . . . 282

Pages.

Sarrú . . . 410
Sarunkasari . . . 361
Sarúl . . . 140
Sarshoti . . . 350
Sasi . . . 316
Saslendi . . . 99
Sat-bur . . . 335
Satiana . . . 262
Satián . . . 262
Satni . . . 262
Satpúra . . . 315
Satpuria . . . 129
Satrai . . . 408
Sattori . . . 262
Satwin . . . 262
Saul kuri . . . 57
Sauna . . . 275
Saunder . . . 147
Saunjla . . . 217
Sautha . . . 200
Saver . . . 372, 373
Sawáli . . . 373
Shama . . . 411
Sehap . . . 419
Sehiap . . . 419
Sealposra . . . 55
Seb . . . 168
Sebe . . . 190
Sechin . . . 281
Sedangtaglar . . . 43
Sedeng . . . 324
Sedongtagla . . . 343
Seeru . . . 234
Seet . . . 158
Segapu . . . 190
Segapu-munthari . . . 140
Segum kati . . . 148
Sehoong . . . 186
Sehshing . . . 407
Sehnd . . . 368
Sein . . . 182
Seina . . . 200
Seindi . . . 419
Sejan . . . 114
Seji . . . 201
Sejna . . . 114
Séju . . . xxix
Sekwa . . . v
Sela vanjai . . . 158
Selcho . . . 160
Selemnyok . . . 264
Selti . . . 270
Selupa . . . 87
Sema . . . 172
Sema dung . . . 408
Semar . . . 270
Seme . . . 154
Semla . . . 141
Sempak . . . 344
Sempangam . . . 6
Sempat . . . 310
Semru . . . 147
Semul . . . 44
Semur . . . 44
Senén . . . 326
Sengel sali . . . xii

Pages.

Sengeni . . . 298
Senibal . . . 42
Senjna . . . 114
Sentung rung . . . 347
Seo . . . 168
Seoli . . . 254
Sephálika . . . 254
Sér . . . 119
Serai-guti . . . 309
Serali . . . iii
Serán . . . 98
Serang . . . 388
Seráya . . . 21
Seregad . . . 272
Serei . . . 383
Serh . . . 105
Serhnyok . . . 106
Serilli . . . 334
Seris . . . 127
Serisso . . . 127
Serkuji . . . 162
Serpa . . . 323
Serva . . . 346
Sessal . . . 60
Seta pajja . . . 91
Set barúwa . . . 315
Set krishnapani . . . 120
Sewan . . . 295
Sewar . . . 261
Sewri . . . 118
Seyapu chandanum . . . 131
Seyára . . . 140
Sey barasi . . . 76
Sha . . . 153
Shabju . . . 352
Shafri . . . 256
Shag . . . 372
Shágali . . . 117
Shahtút . . . 328
Shaing . . . 111
Shák . . . 372
Shakab . . . 340
Shakai . . . 326
Shakardana . . . 300
Shakshin . . . 372
Shal . . . v
Shalakát . . . 20
Shalanghi . . . 308
Shalanglu . . . 311
Shalangri . . . 315
Shalgari . . . 116
Sháli . . . 254
Shalshi . . . 387, 388
Shami . . . 147
Shamieula . . . 42
Shamor . . . 89
Shamru . . . 120
Shamshad . . . 369
Shandalaghúne . . . 369
Shang . . . 256
Shangal . . . 256
Shangala . . . 82
Shangti . . . 398
Shanjan . . . 119
Shaoul . . . 373
Shapri . . . 256

Pag s

Shaptı 199
Shara vanı 17
Shargır 237
Shar 162
Shar fa 9
Sharol 390
Shash 106
Shasoung 368
Shasoung leknyo 368
Sha soung pya thal 368
Shatoobeng 309
Shául 372
Sl aurıa 87
Shaursı 272
Shawal 166 ºº7
Shayrang 111
Sheabo°e 235
Shealbuk 311
Sheashong 317
Shech n 280 281 299
Sl edbarwa 315
Shegul 168
Shej 200
Shekram 160
S ekran 160
Shelangrı 298
Sl elda 3 8
Shem 76
Shembal 44
Shembugha 6
Shem 147
Sl en pat 58
Shenen ung 109
Shendrı 361
Shengutan 2₅1
Sheodur 1º9
Sheora 327 3º3
Sheor 372
Shepkyew 57
Sherawane 87 91
Sl er man 185
Shermana 119
Sl ewa 168 1º4
Shewan 295
She varı 118
Sl ewney 295
Sh b ka 104
Sh l 200
Sl du 368
Sh ka d 166
Sl ll 206
Sh ll ng º5
Sh lvo 148
Sl n arra 136
Sh n bu 6
Sh mtı 110
Shín 1 1
Sl ndar 168
Sl luga 158
Sl ng 315
Sh ngalı 389
Sl ı garı 166
Sl ngr 144
Sl ngra 358
Sh nwala 23
Sh ol 139

Pages

Shıran 162
Sh rash 390
Sh rlan 44
Sh rsh 159
Sh rsha 160
Sh sham 1º4 127
Sl lı 159
Sl tzem 61
Shıul k 317
Sh untra 266
Shı val 28º
Sh warı 297
Sl ko 341
Sho 4º
Shomfol 91
Shomsh ng 398
Shoondul 141
Shrol 373
Shta 3º6
Shu 168
Shue 106
Shuf talu 162
Shuk 319
Shuknı 3
Shukpa 412
Shulundu kora 230
Sl umaj 369
Shu nanjra 100
Shumbul xx
Shun 256 3 7
Shundapana 420
Sl upa 411
Sl ur 41º
S urbuta 412
Sl urgu 412
Sh rl 390
Shuruzbed 8
Sl an 258
Shwet s múl 4º
Shyokul 89
Sl jona 275
S a 166
S lı 1º3
S alu 211
S aru 3º6
S brı 357
S br ú 148
S da 200
S lemuyok 69
S lha xxi
S dhera 84
Siffoo 5
S k 150
S grıp 6
S umgrıp 5
S l ar 139 º61
S haru 254
S j 368
S ju 2 6
S kat xxv
S kekaı 150
S k rup xx
S kı 84
S kkaı 160
S kriba xx ı
S.kru xı

Pages

S lang º57
S lapoma 393
S l rı 156
S l kha 181
S l m 180
S l ngı 254 257
S lkant 306
S l koro 159
S llangt 4
S l ı 4º9
S ll k rta 212
S lt mber 309 313
S lu 270
S m 136
S ma 241
S mal 8
S mal 61 102
S mbal 44
S mbrangr p 218
S me hunase 145
S me tan adlı 138
S mı 211
S mlı 68
S mo g 4º0
S mı letbuk º66
S mrung 237
S mul aloo xxv ı
S mul turul xxvı ı
S myanga xxv ı
S na º01
S nakadang 69
S d 315 3 8
S ndı 419
S ndr 293
S lrol 91
S ndurı 361
S ndur a 361
S ndurpo g 361
S ndwar xxv ı
S ngbrang ıv
S nghanı 427
S nghara 389
S n hata 4 00
S gı 84
S ka 169
S l ang 174
S ngna 213
S ngnamuk 1
S ngnok 1C º2
S graf 310
S ngrauf 310
S ngr ang 160
S gtok 3 3
S guru 253
S ıgya xvıı
S ngyan 3
S ngy n 2 8
S nıl 68
S nkan 306
S nkozi 307
S n ma no-py n 3 6
S nua 2º7
S nush 316
S neng 33
Sın thabpan 340
S ora 327

	Pages.
[illegible]	29
[illegible]	162
[illegible]	258
[illegible]	156, 357
[illegible]	158, 160
[illegible]	127
[illegible]	201
[illegible]	97
[illegible]	87, 387
[illegible]	289
[illegible]	156
[illegible]	156, 159, 164
[illegible]	201
[illegible]	290
[illegible]	26
[illegible]	156, 158
[illegible]	156
[illegible]	317
[illegible]	278
[illegible]	127
[illegible]	317
[illegible]	312, vii
[illegible]	vii
[illegible]	213
[illegible]	127
[illegible]	124
[illegible]	38, 124
[illegible]	127
Sisu	127
Sita	9
Sitabér	90
Sita pelu	vii
Sitaphal	9
Sitapundu	9
Sitarjat	56
Sitarsaar	56
Sitayok	336
Sitsal	127
Sitta	142
Sittamindi	363
Sittamunuk	363
Sitto udal	47
Sivettachim	282
Sivor	273
Siyembela	142
Skioch	84
Soá	328
Soanjua	114
Sodhera	267
Sodoi	339
Soháya	73
Sohajua	114
Sohan	76
Soilo	248
Soimi	76
Soka	135
Sokutia	201
Sola	119
Solei	300
Solomanim	158
Somi	xviii
Somr	44
Somri	208
Somso	xii
Somun	255
Sona	140, xxvi
Sonái	315
Songjáli	255
Sopalu	136
Soobarra	129
Soon patta	xxvi
Sonkairi	150
Sonkhair	153
Soochu	32
Soom	308
Soondi	425
Soopuotuway	150
Soothan	110
Soovit	155
Sophi	391
Sopho	161
Soplong	414
Sopúnd	368
Sori	275
Soringhi	34
Soso	xv
Sosokera	xxviii
Sotege	365
Soudar-padal	279
Soundalay úunu	48
Soungyah	58
Sow	160
Sowkabent	425
Sozong	275
Spalwakka	265
Spera wuna	267
Sperchersi	383
Sperdor	378
Spiág	426
Spikso	426
Spun	408
Starga	392
Sua	281
Suali	300, 379
Sual kuri	57
Sualu	310
Suam	xii
Sudhari	267
Súdúnika	297
Suféda	378, 379
Sufok-ji	165
Suglim	83
Sugroomuk	282
Sugvat	206
Suha-rúk	3
Suiminta	118
Sujuna	114
Sukali	323
Sukat sing	371
Sukri-ruia	xxii
Sula	396
Súli	78
Súlia	169
Sulla	355
Sullea	429
Sulopa	420
Sultana champa	25
Súm	256
Suma	154
Súmáli	282
Sumbling	354
Sumbrong	29
Sumcher	281
Sumi	76
Súmlú	13
Summun	255
Sun	168
Sunakhari	268
Sunari	65
Sunaru	136
Súnd	170
Sundali	136
Sundeh	164
Sunder	47
Sundi-bet	424
Sundók	231
Sundragundi	361
Sundri	47
Súng-a	282
Sungal	413
Sungeba	413
Sungden	10
Sungli	373
Sungloch	185
Sunglú	44
Sunglyer	25
Sungna	294
Sungoo	81
Sungotta	423
Sungray	134
Sungribong	379
Sungrú	60, viii
Sungsúm	344
Sungung rik	139
Suni	255
Sunkanwal	308
Súnkawal	308
Sunkeint	168
Sunkeswar	134
Sunkong	332
Sunkrong	323
Sunlu	13
Sunn	117
Súnnu	256
Sunóm	193, 194
Suntala	59
Suntong	208, 210, 209
Suntri	ii
Suom	352
Supari	421
Suphut	310
Suppatnyok	310
Suragada	xxix
Suran	90
Surangru	159
Suranji	160
Sura-ponna	21
Surat	323
Súrah-vyu	410
Súreh	317
Sureya	43
Súrganch	166
Surgi	412
Suria	148
Suringi	21
Surjmukha	59
Surkala	266
Súro	368

	Pages
Surroh	3o5
Surs	368
Sur s njh	1"0
Surtári	200
Surteh	xvii
Surteyli	200
Sórudu	282
Surul	308
Suss	326
Sussu	214
Suvanda	26
Suvarnam	136
Suvirk	393
Swa tan	139
Swána	315
Swanjera	114
Swetakand	26o
Syalita	2

T

	Pages
Tabong de ng	304
Tabsi	46
Tabs i	46
Tacl ansa	209
Tad	416
Tadda pallu	230
Tad lo	50
Tadra	92
Ta lru	91
Tagada	278
Tagasbing	39?
Tagl a	343
Tagl o	343
Tagooyi	197
Tagumuda	29o
Taggai	2C3
Taggar	263
Taggu	236 418
T haka	1"9
Tabási	2o6
Tai	°o1
Tai beng	248
Ta k rau	339
Ta ladu	i i
T ilo	388
Ta oh ,	3oo
Ta tu	2"8
Taka	179
Tak bret	324 3°o
Takel al r k	3o9
Takel rnyok	230
Taker	14
Takhral	10
Takhum	313
Taki	140
Takla	21C
Takli	4C
Takm r	158
Takoli	128
Takos i	4"0
Takpa	3"-
Tak jadik	° ,r
Takpo	262
Takjoodnik	219
Takpyit	145
Takribet	4°4
Taksielnk	4
Taksor	5C 18?
Taksot	339
Taksur	3°4
Taktokhyem	14o
Taku	16o
Tal	416 418
Tala	417
Talainyom	418
Ta li ku wa	4°8
Talari	34
Tal	416
Tall ang	215
Tal	124 242 416
Tal b da	3o9
Tal er	417
Tal sa	23o
Tal sapatri	17
Tal sfar	23o
Tal spatri	1"
Tal sri	23o
Talkar	87
Talle	162
Talpat	421
Tals ari	3°6
Tals r	23o
Talum	4°o
Talura	34
Tama	430
Tamák	222
Ta ma kha	70
Tamalamu	23
Taman	202
Tamana	318
Tamayoke	22o
Tambagum	39
Tamboli	272
Tambugai	39
Tamonban	238
Ta i oo	20o
Tamruj	87
Tanaku	17 187
Tanap	293
Tar lai	1o9
Tan lila	334
Tar lei	215
Tandi	1"9
Tang	168
Tangar	13C
Tangaruk	"3 xi
Tange lu	136 148
Ta ksaing	408
Tai i	179
Ta ki	364
Tankyet louk	114
Ta ou g	1o2
Tant a	124 1o6
Tanuku	4C
Tanyengl po	5 i
Tanyengnee	118
Tapa l yer	213
Tapel i	30?
Tajk l	2 6
Tapoo	20o
Tapooben	63
Tapoukben	129
Tapjaddar	301
Tapra	231
Tapr a s ris	159
Tapuya	211
Tapyoo	205
Tar	266 416
Tara	162 117
Tarada	vii
Taráh	53
Taraka vepa	70
Tarana	226
Taraphee	21
Tareo	182
T ra ga	21
Tarit	417
Tarkhana	101
Taro	109
Tarota	136
Tarru	317
Tarsi	"42
Tars ng	309
Ta uka	69
Tarum	xv
Tarwar	136
Tasl a	3o2
Tash ari	3°6
Tateb ri	1°9
Tátmon ng	2"o
Tatpalang	2 5
Tatri	3 10o 106
Tatti	418
Tattu úa	2/5
Tat a	164
Tatuke	303
Tau l tam	418
T u kwam thee	421
Tau magyee	57
Ta i muya n	117
Taur	139
Tau sa lap	262
Taushouk	59
Tau ta ma kl a	69
Tau tl ayet	107
Tau theed n	3C1
Tauzeei way	89
Tay	2o2
Tayan	3C8
Tav pagal	260
Tayo voq vay	58
Tazak tsu n	235
Tel e rav sulal	413
T lend n	110
Tchokpo	412
Tel ongtay	339
T a lo g	3 |C
T akah	219
T llajat	2C4
Tel ng	1 8
Tega	2o3
Tec lan	98
Tega a mugu	3
Teila	
T ngala	
Te	

Term	Pages
Tek	283
Teka	283
Tekatasij	368
Tekka	283
Tekku	283
Tekreng	68
Teku	283
Telaki	298
Telél	228
Teley	vii
Teliga	228
Telinga-china	200
Tella chindagu	158
Tellagada	248
Tella júvi	272
Tella-kaka mushti	343
Tella kakisha	228
Tella madu	184
Tella-manga	228
Tella motkú	119
Tella-pal	264
Tella púnki	365
Tella sopara	158
Tella-túma	152, 153
Tellavoolemara	15
Telli	225
Telphetru	226
Telsu	158
Telsur	112
Tellu kurwan	230
Telus	119
Temru	249, 251
Tendu	249, 251
Tenga	422
Tengina	422
Tenkaia	422
Tenna	422
Tentúle	142
Teóri khair	153
Teotosa	237
Tepor	23
Teprong	329
Ter	162
Terhilnyok	59
Terhilsok	309
Terolrik	122
Tessal	viii
Teteli	142
Teto	279
Tetri kair	353
Tetta manga	228
Tettam-parel	268
Tettancottai	268
Tettian	268
Tetu	275
Tetúliya	156
Teturl	34
Teturldumm	172
Tewar	141, xviii
Tewas	119
Tewsa	119
Teyrúr	59
Tezmal	60, viii
Tezpat	305
Thab	121
Thabola	56
Thabútgyee	9
Thabwot-nway	8
Thabyai-pyoo	194
Thabyay	98, 196
Thabyaynee	193
Thabyoo	2
Thabyoo-thabyay	193
Thadee-ben	67
Thadsal	54
Thágu	278
Tha-hpan-ben	333
Thaikwa	427
Tháil	377
Thaila	211
Thain ban	242
Thaing	220, 221
Thainpuche	45
Thaka	354
Thakal	415
Thakil	419
Thakoopho	278
Thakootna	276
Thakyet	425
Thala	425
Thalai	342
Thalay	425
Thalay marathu	96
Thalé	205
Thalein	214
Thali	102
Thali kabashi	99
Thalma	419
Thalot	91
Thalu	418
Tha-ma-ka-nway	179, 282
Thambá	39
Thame	299
Thamengsanee	228
Thammal	212
Thamther	53
Thanat	270
Thanat-tau	22
Thanday	277
Thandra	179
Thanella	228
Thanera	408
Thangi	390
Thanka	392
Thánki	169
Thankoli	390
Thankya	242
Thanloong	10
Thansa	396
Thanthat	159, 279
Thaortay	187
Thapru	2
Thapsi	342
Thapur	338
Thara	179
Tharbal	212
Tharrá	54
Tharwar	212
Thaukjot	94
Thaur	139, xviii
Thawi	200
Thawka	135
Thaw-ka-hpo	144
Thayet	107
Thayet san	104
Thayet-thee-nee	107
Thayet-thitsay	109
Thayoh	53
Theedin	16
Theebaya-za	59
Thee hoh thayet	108
Theeshe	427
Theing	423
Theinkyeng	425
Theiwa	427
Thekrinapay	186
Thelain	215
Thelli	68
Thelu	411, 412
Thengben	42
Thenpinna	422
Theot	117
Thesi	212
Thikado	79
Thilak	315
Thilkain	214, 215
Thimban	42
Thimbau-ta-ma-kha	69
Thimbawthee	207
Thinbau-kyeksu	365
Thinboung	419
Thin-bozi-pyoo	351
Thingado	31
Thingan	40
Thingáni súla	408
Thingan-nee	23
Thingia	408
Thinwin	133, 118
Thirmal	311
Thitcha	385
Thitcho	241
Thit-hpaloo	268
Thitka	52
Thitkado	78
Thitkatong	69
Thitkya	249, 380, 385
Thit kyouknway	260
Thitlinda	277
Thitmagyi	158
Thitmanku	164
Thitmyoke	360
Thitnee	73
Thitnun	414
Thitpasaing	72
Thitpayoung	221
Thitpoke	128
Thitpouk	208
Thitpyoo	11, 19
Thitsanweng	129
Thitsap	355
Thitseeben	110
Thitsein	179
Thitsway lway	255
Thityooben	64
Thitto	72, 219
Thitya	30, 39
Thityin	350
Thmari	205

Pages
Thodagatti . 127
Thoja . 339
Thondi . 355
Thoognaychay . 49
Thor . 368
Thoras . 123
Thorliganj . 146
Thoska . 10
Thoukwa . 427
Thula . 44
Thúm . 92, 256
Thúna . 413
Thundri . 206
Thúner . 413
Thúnu . 413
Thuringi . 160
Tiamle . 340
Tian . 98
Tidhara . 368
Tiga mushadi . 11
Tige motku . 123
Tigroht . xv
Tihiri . 158
Tikhar . 317
Tikil . 22
Tikjik . 167
Tikkoe . 220
Tikphal . 28
Tikri . 11
Tikta raj . 73
Tikto shak . 16
Tikur . 22
Til . 280
Tila . 225
Tilai . 225
Tilangsa . 383
Tilits . 215
Til chang . 376
Tilhang . 215
Til hetter . 209
Tilia koru . 11
Tihya gurjun . 31
Tilki . 225
Tilliah . 225
Tilonji . 383
Tilpara . 12
Tilpattar . 100
Tilpattra . 211
Tilun . 116
Timal . 340
Timar rákh . 393
Timberee . 252
Timbernyok . 257
Timbúr . 60, viii
Timburni . 249, 251
Timburnyok . 61
Timil . 211
Timla . 340
Timmurri . 249
Timru . 251
Timsa . 119
Timsha . 383
Timukhia . 261
Timur . 60, viii
Tingschi . 413
Tinia . xix

Pages
Tin lwong beng . 219
Tinnas . 119
Tinsai . xvi
Tintil . 142
Tintiri . 142
Tintul . 142
Tinyu . 346
Tinyu ben . 397, 398
Tinwa . 429
Tippa tiga . 11
Tirawa . 148
Tiril . xxiv
Tirmal . 340
Tirman . 185
Tirmi . 340
Tirpu . 40
Tirsam . 82
Tirukalli . 368
Tissi . 376
Tita bateri . 216
Tita pat . 233
Titar . 106
Titasappa . 6
Tithora . 311
Tithu . 65
Titi negalla . 427
Titpagan . 118
Titpati . 301
Titri . 104, 105, 142
Titún . 330
Toandi . 179
Toaratti . 15
Tode . 102
Togara mogali . 232
Toghur . 232
Togri . 117
Tokopat . 418
Tokra . 298
Toksot . 340
Tolan . 230
Tol rik . 155
Tolu aselu . 166
Tomi tomi . 17
Tongrong . 113
Tongschi . 398
Tongsor . 299
Tón nyok . 129
Topa . xx
Topal . 152
To pat nyok . 280
Toper . 129
Topia . 129
Toponi . 330
Toposi . 218
Tora bujja . 281
Tor ban . 297
Tor-elaga . 59
Torjaga . 94
Tos . 407, 408
Toska . 310
Totilla . 275
Totka bendi . xxix
Totmula . 340
Tot nya . 303
Tougtaw . 421
Toukkyan . 183, 184

Pages.
Touk Shama . 102
Toukyap . 353
Toung da ma . 77, xiii
Toung hmayo . 86
Toung-hpek wan . 363
Toung kalamet . 271
Toung ka thit . 122
Toung kyeng . 425
Toungletpet . 28
Toung maizalee . 138
Toung mayobeng . 262
Toung ong . 421
Toung peingnai . 330, 331
Toungpetwoon . 49
Toung pung . 18
Toungsaga . 314
Toungsookapan . 58
Toungtamin . 120
Toungthabyay . 193
Toungthalay . 24
Toung thanat . 270
Toungyohpyeezeng . 187
Toupreng jan . 355
Towa . xxvi
Trano . 394
Trekban . 100, 101
Trimal . 340
Trimbal . 334, 340
Trimmal . 340
Triphasia . 69
Tsaga . 6
Tsaingtsa . 278
Tsajakela . 334
Tsalu . 236
Tsaluma . 236
Tsambelay . 201
Tsapatt . 394
Tsápo . 91
Tsashing . 413
Tsarap . 317
Tsaratpang . xv
Tsarma . 317
Tsatin . 319
Tsat tha pu . 425
Tsatya . 323
Tsui . 368
Tsúk . 317
Tsuma . 236
Tsuman . 255
Tsaybeeloo . 255
Tsay tham byah . 229
Tse . 394
Tseetkado . 78
Tseikchay . 94
Tseik poban . 208
Tsekoban . 351
Tselain . 215
Tsema . 13
Tserkar . 317
Tsermang . 317
Tshirka . xiv
Tsonu . 255
Tsoukmayla . 73
Tsatuka . 279
Tue . [illegible]
Tugla . [illegible]

	Pages.
Tugom	239
Túk	18
Tuki	251
Tukla	361
Tukuu	303
Tuksat	315
Túl	327, 328
Tula	45
Tulae-myom	418
Tula-lodh	225
Túlanch	166
Tulda	427
Tulenniphúl	219
Túlklu	327
Túlúkúl	328
Túma	151
Tumar	427
Túmari	82, 389
Tumbali	249
Tumberh	218
Tumbi	249, 251
Tumbika	252
Tumbomri	21
Túmbri	211
Tumbrúng	81
Tumbúk	212
Tumi	249
Tumida	249
Tumika	252
Tumil	252
Tumki	249
Tumma	152, 214
Tummer	249
Túmra	104
Tumri	211, 249, 359
Tún	78
Tunang	123
Tunani zanani	92
Tunáni zenáni	215
Túndhe	215
Tundhi	92
Tundú	78
Tundupara	ix
Tung	104, 413, 408, 361
Túnga	104
Tungbran	199
Tungcheong	239
Tungcher	350
Tungchong	28, 254
Tungflam	359
Tunggor	14
Tungnyok	99
Tungrangmook	274
Tungrong	269
Tungrung	257
Tungu	106
Tunguk	217
Túni	78
Tunka	199
Tunnia	119
Túnnú	256
Tupail	133
Tupi	412
Túrapáni	319
Turgu-wah	428
Turka-vepa	81
Turmong	282
Turras	413
Tusbi	10
Tusi	340
Túslús	214
Tút	318, 327
Tutteály	57
Tuthai	64
Tutri	328
Twika vepa	81
Twottapat	241

U.

Ubbolu	17
Uchay	xvii
Uchki	i
Udagu	211
Udal	46
Udar	46
Udare	46
Udatalle	199
Udda	276
Udha	430
Udis	373
Udish	373
Ughai	259, 260
Ughz	392
Ugúr	316
Ugúrassa	18
Uguru	368
Uk	265
Ukbeiriye	178
Ukhan	20
Ukieng	354
Uklu	215
Ukotang	430
Uli	xv
Ulimidi	15
Ullalu	308
Ullat kumal	45
Ullo	323
Ullu	275
Ulta-kanta	14
Ulu	xvii
Umar	339
Umbli	393
Umrai	339
Umtoá	349
Una	428
Undergúpa	356
Undi	25
Ungdung	310
Ungnai	327
Untkatar	278
Unyo	431
Upalkai	363
Uparanthi	304
Upligi	363
Upoo-poma	176
Upphing	73
Uranechra	80
Urbúl	340
Urchirri	81
Urgu	211
Úri	135
Uriam	355
Urigáb	248
Urimidi	137
Urmúl	340
Urn	135
Urni	390
Urri	298
Uru	211, 412
Uruk	xxvi
Urúm	355
Urumatti	15
Urumin	xxvi
Usan	182
Usaqueng	22
Usiki	15
Usir	352
Usken	427
Uskia	15
Uskiamen	137
Usri	352
Ussey	430
Ustumri	268
Utali-panna	420
Uterr	xvi
Utis	372
Uva	2

V.

Vackana	251
Vada	333
Vadatalla	148
Vadatara	148
Vadencarni	279
Vadúr	430
Vaghe	156
Vaka	421
Vake nar	46
Vakru	393
Valange	129
Vallanga	62
Vallay kungiliam	41
Vallúr	11
Ván	260
Vanboga	39
Vanga	275
Váni	260
Vanúthi	354
Vari	384
Vassuntagunda	361
Vasúka	281
Vattikanni	363
Vavili	296
Vavoli	245
Veçkali	185
Vedam	182
Veddar	430
Vedda vala	150
Vedru	428
Velá	62
Velagá	62
Vela-padri	278
Velenge	50
Vella cadamba	220

	Pages
Vella kon lrikam	41
Vellam	x
Vella mar la	184
V lla maruthu	184
Vella matt	184
Vellanuch	297
Vella thornsay	343
Vellay naga	185
Vellay put l	46
Velturu	148
Velvaghe	159
Velvaylam	159
Velvelam	153
Vempa	69
Vena	261
Vendale	365
Venga	139
Ventaku	201 209
Venteak	201
Vepal	263
Verasu	2 0
Ver	266
Veyala	297
Veypale	264
Veypam	69
V d	270
V layat babul	150
V layati k kar	150
V l a	63
V rg	2 0
Voavanga	219
Vun e	147
Vurtuli	148

W

	Pages
Waa	138
Wabo	498
Waddan	358
Wa lrase	2C
Wagatta	2 C
Wa hz	39
Wah	430
Wal al	319
Wal gl	497
W l ka teh	498
Wal nok	430
Wal r ngur	8C
Wakle	430
Wall l u	64
Wal kadu la	134
Wale a	4
Wal vara	v
Walkakoo a	365
Walkóm	
W lla	315
Walla ki	44
Wallunj	3 6
Wall rs	4
Walsapu	C
Walsura	4
Wampu l ta	301
Wa a	29
Wa nah	498
Wa net	4 8
Wansh	105
Wa n vay	431
Wa pyoo galay	490
War	333 334
Warag i wenki	259
Wara vi	390
W rga	136
Warras	277
Warung	43
Wasa	206
Watal	84
Watha bo wa	499
Watte	499
Wawah	349
Waya	430 431
Wa ya	430
Wel mada	414
Welkyla	303
Well p yanne	1 8
Wetkyotbeng	94
Wet shaw	47
Wetyar	419
W nri	390
W ralu	5
W r	390
W varana	307
Wodayu	358
Wodesha	358
Wo l	2 C
Wod er	110
Wo d	76
Wóra	33C
Wude	110
Wuma	25
W man	408
W mb	97
Wund	21
Wun	153
Wu ja	160
W rak	91
Wu r ya	390
Wusel	x x
Wusta	xxix

Y

	Pages
Yae ch nya	354
Yag ne	35
Ya vo	231
Yaka twa	498
Yak sli	69
Yal sl n	100
Yamaney	205
Ya natl a	4 3
Ya n lal	413
Ya go	1 3
Yangkup	134
Yaja	69 143
Yara	398
Yarpa	378 3
Yarta	235
Yatl	100
Yaycl iyi	124
Yay ta gyeeben	364
Yaythagyeo	118
Yea kath	121
Yeanga	132
Ye ch n	347
Yeggi	132
Ye isa	132
Yehera	179
Yekaddi	19
Yekal	87
Ye kha ong	339
Ye k n	319 368
Yekka	265
Yel	244
Yelch	88
Yel nga wad nika	3 0
Yella madd	185
Yella malla kal	204
Yellande	88
Yellanga	63
Yella tha	x v
Yelnyo	167
Yelparas	193
Yelpote	244
Yelts	19
Yeltu	148
Ye e n	305
Ye myot	300
Ye i	183
Yend ke	1 8
Yengkl at	299
Ye ma	6
Ye gyo	178
Ye ki	3 3
Ye e	143
Yepa	69
Yeppa	243 244
Yercu n	265
Yerjool etta	158
Yerj el ta	158
Yeru a	186
Yerma ld	184
Yerr el cath	91
Yerragoda	251
Yerra juvi	65 336
Yerra pe tsaru	198
Yerra purugudu	347
Yerugu l i	1 7
Yetega	2
Y tl al yay	194
Ye tl a pan	319
Yetta la	270
Yettama	185
Yette	1 4
Y ttéga	5
Yett	16
Yet oon	4
Yi	209
Y mu ah	6
Y gan	4 5
Y r	3 6
Yiro	398
Yodavah	6C
Yoro ia	333
Yok	33C
Yokel onnik	201
Yok lung	332
Yomal nvo	347
Young kalav	

	Pages.
Youngzalai	22
Yulatt	378
Yúmbok	311
Yung	186
Yungben	186
Yurmi	237
Yúr	377, 398
Yúri	398
Yúru	383
Ywaygyee	146

Z.

	Pages.
Zadeip hpo	314
Záih	383
Zaitun	187, 253
Zam	163
Zambrún	3
Zambu	163
Zangihar	181
Zanonng	420, 425
Zardalu	162
Zardkunél	260
Zbang	215, 216
Zebri	193, 194
Zeeben	88
Zemardachan	93
Zemaro	93
Zhiko	216
Zimbyún	3
Zir	336
Zirishk	13
Zolim-buriki	95
Zopru	311
Zosho	315
Zúm	163

INDEX TO NUMBERS OF WOOD SPECIMENS.

No	Name	Page	No	Name	Page
1	Quercus incana	385	H 49	Prinsepia utilis	165
H 2	„ „	385	H 50	Rosa macrophylla	*167*
H 3	Abies Smithiana	408	H 51	Desmodium tiliæfolium	120
H 4	Quercus dilatata	384	H 52	Viburnum cotinifolium	214
H 5	Cedrela Toona	79	H 53	„ fœtens	215
H 6	Pistacia integerrima	107	H 54	Symplocos cratægoides	254
H 7	Juglans regia	xxx	H 55	Cotoneaster bacillaris	171
H 8	Cedrela Toona	79	H 56	Taxus baccata	413
H 9	Juglans regia	392	H 57	Corylus Colurna	391
H 10	Morus serrata	328	H 58	Prunus Padus	164
H 11	Pistacia integerrima	107	H 59	Ulmus Wallichiana	341
H 12	Abies Smithiana	408	H 60	Meliosma dilleniæfolia	103
H 13	Pinus longifolia	397	H 61	Cupressus torulosa	410
H 14	Rhododendron arboreum	236	H 62	Acer villosum	100
H 15	Juglans regia	392	H 63	Litsæa zeylanica	311
H 16	Cedrus Deodara	406	H 64	Pyrus lanata	169
H 17	Pieris ovalifolia	235	H 65	Abies Webbiana	409
H 18	Taxus baccata	413	H 66	Salix daphnoides	377
H 19	Rhus punjabensis	105	H 67	Euonymus lacerus	84
H 20	Prunus armeniaca	162	H 68	Coriaria nepalensis	113
H 21	Ilex dipyrena	81	H 69	Hedera Helix	210
H 22	Prunus Padus	164	H 70	Rhamnus purpureus	92
H 23	Pyrus Pashia	169	H 71	Elæagnus umbellata	318
H 24	Quercus incana	385	H 72	Quercus semecarpifolia	382
H 25	Cedrela serrata	79	H 73	Rhododendron arboreum	236
H 26	Cotoneaster bacillaris	171	H 74	Acer caudatum	100
H 27	Acer caudatum	100	H 75	Rhamnus triquetrus	92
H 28	Morus serrata	328	H 76	Viburnum cotinifolium	214
H 29	Juglans regia	392	H 77	Buxus sempervirens	371
H 30	Cupressus torulosa	410	H 78	Cornus capitata	213
H 31	Æsculus indica	95	H 79	Rhamnus virgatus	91
H 32	Euonymus tingens	85	H 80	Berberis aristata	13
H 33	Acer cæsium	100	H 81	Lonicera quinquelocularis	216
H 34	Populus ciliata	379	H 82	Spiræa sorbifolia	165
H 35	Juglans regia	xxx	H 83	Alnus nepalensis	374
H 36	Celtis australis	344	H 84	Cornus macrophylla	212
H 37	Pinus excelsa	399	H 85	Rhus Cotinus	104
H 38	Buxus sempervirens	371	H 86	Euonymus pendulus	85
H 39	Quercus semecarpifolia	382	H 87	Myrica sapida	391
H 40	„ dilatata	384	H 88	Debregeasia bicolor	326
H 41	Acer caudatum	100	H 89	Rhus semialata	105
H 42	Cedrus Deodara	406	H 90	Quercus annulata	387
H 43	Abies Smithiana	408	H 91	Phœbe lanceolata	308
H 44	Vitis himalayana	44	H 92	Machilus odoratissima	300
H 45	Berberis Lycium	14	H 93	Pinus longifolia	397
H 46	Prunus Padum	163	H 94	Cornus capitata	213
H 47	Salix daphnoides	377	H 95	Morus serrata	328
H 48	Berberis coriacea	14	H 96	Albizzia Lebbek	157

No.	Name.	Page.	No.	Name.	Page.
E 366	Eriobotrya elliptica	168	H 427	Cinnamomum Tamala	306
E 367	Symplocos ramosissima	254	H 428	Juglans regia	393
E 368	Daphnidium pulcherrimum	313	H 429	Symplocos cratægoides	254
E 369	Rhododendron Falconeri	237	H 430	Cedrela serrata	79
E 370	Symplocos	254	H 431	Acer cæsium	100
E 371	Rhododendron arboreum	236	H 432	„ pictum	101
E 372	„ argenteum	236	E 433	Quercus annulata	587
E 373	Hydrangea vestita	172	E 434	„ lamellosa	388
E 374	Juniperus recurva	412	E 435	Machilus odoratissima	309
E 375	Rhododendron barbatum	237	E 436	Acer Campbellii	101
E 376	Corylus ferox	390	P 437	Cassia Fistula	137
E 377	Abies dumosa	408	P 438	Phyllanthus Emblica	352
E 378	Pyrus foliolosa	169	P 439	Cassia Fistula	137
E 379	Osmanthus	257	P 440	Acacia arabica	151
E 380	Pyrus vestita	169	P 441	Aegle Marmelos	63
E 381	Betula Bhojpattra	372	P 442	Zizyphus nummularia	89
E 382	Taxus baccata	413	P 444	Capparis aphylla	15
E 383	Rhododendron arboreum	236	P 445	Ulmus integrifolia	342
E 384	Daphnidium	313	P 446	Anogeissus latifolia	186
E 385	Eurya symplocina	28	P 447	Odina Wodier	111
O 386	Shorea robusta	38	P 448	Balsamodendron Mukul	67
O 387	„ „	38	P 449	Cordia Rothii	272
O 388	„ „	38	P 450	Balanites Roxburghii	65
O 389	Terminalia tomentosa	184	P 451	Tamarindus indica	143
O 390	Shorea robusta	38	P 452	Eugenia Jambolana	195
O 391	Terminalia tomentosa	184	P 453	Bauhinia racemosa	140
O 392	Ulmus integrifolia	342	P 454	Anogeissus pendula	187
O 393	Terminalia tomentosa	184	P 455	Acacia Catechu	154
O 394	Anogeissus latifolia	186	P 456	Wrightia tinctoria	264
E 395	Sonneratia acida	205	P 457	Pongamia glabra	133
E 396	Excæcaria Agallocha	368	P 458	Stephegyne parvifolia	222
E 397	Cynometra ramiflora	144	P 459	Prosopis spicigera	147
E 398	Avicennia officinalis	300	P 460	Flacourtia Ramontchi	18
E 399	Sonneratia apetala	205	P 461	Briedelia retusa.	356
E 400	Cerbera Odollam	262	P 463	Melia indica	70
E 401	Heritiera littoralis	48	P 464	Dalbergia latifolia	127
E 402	Carapa moluccensis	74	P 466	Bombax malabaricum	44
E 403	Afzelia bijuga	142	P 467	Dalbergia latifolia	127
E 404	Ficus retusa	336	P 468	Albizzia Lebbek	157
E 405	Hibiscus tiliaceus	43	P 469	Diospyros Melanoxylon	249
E 406	Ægiceras corniculata	241	P 470	Grewia asiatica	55
E 407	Kandelia Rheedii	177	P 471	Sterculia urens	46
E 408	Antiaris	332	E 473	Pandanus furcatus	425
E 409	Excæcaria indica	367	E 474	Bauhinia Vahlii	139
E 410	Lagerströmia Reginæ	203	E 476	Acacia pennata	155
E 411	Pongamia glabra	133	E 477	Entada scandens	145
E 412	Bruguiera gymnorhiza	177	E 478	Acacia Intsia	155
E 413	Eugenia Jambolana	195	E 479	Millettia auriculata	xvi
E 414	Amoora cucullata	73	E 480	Spatholobus Roxburghii	122
E 415	Afzelia bijuga	142	E 481	Randia dumetorum	227
E 416	Phœnix sylvestris	419	E 482	Bauhinia anguina	139
E 417	Cocos nucifera	422	E 483	Mucuna imbricata	121
E 418	Borassus flabelliformis	417	E 484	Vitis lanata	xiv
E 419	Areca Catechu	421	E 485	„ repanda	xiv
H 420	Abies Smithiana	408	E 486	„ elongata	xv
H 421	„ Webbiana	409	E 487	Plecospermum spinosum	327
H 422	Taxus baccata	413	E 488	Mezoneurum cucullatum	134
H 423	Quercus annulata	387	E 491	Schima Wallichii	30
H 424	Buxus sempervirens	371	E 492	Dalbergia latifolia	127
H 425	Olea ferruginea	258	E 493	Randia dumetorum	227
H 426	Myrica sapida	193	E 494	Castanopsis indica	389

No	Name	Page
E 495	Castanopsis tribuloides	389
E 496	Homonoya symphylliæfolia	364
E 497	Shorea robusta	38
E 498	Cinnamomum obtusifolium	305
E 499	Spondias mangifera	113
E 500	Terminalia myriocarpa	185
B 501	Croton argyratus	359
B 502	Rhizophora mucronata	176
B 503	Pajanelia multijuga	280
B 504	Garcinia speciosa	23
B 505	(Meliaceæ)	79
B 506	Albizzia procera	159
B 507	Melia	71
B 508	Podocarpus bracteata	414
B 509	Myristica Irya	314
B 510	Lagerströmia hypoleuca	204
B 511	Hopea odorata	40
B 512	Artocarpus Chaplasha	331
B 513	Mimusops littoralis	246
B 514	Planchonia littoralis	198
B 515	Croton argyratus	359
B 516	Odina Wodier	111
B 517	Heritiera littoralis	48
B 518	Albizzia procera	159
B 519	Murraya exotica	62
B 520	Mesua ferrea	27
B 521	Diospyros Kurzii	250
B 522	Terminalia alata	184
B 523	Adenanthera pavonina	146
B 524	*Afzelia bijuga*	*142*
B 525	Calophyllum spectabile	25
O 526	Pterocarpus indicus	130
O 527	Eugenia Jambolana	195
O 528	Terminalia Chebula	181
O 529	Stephegyne parvifolia	222
O 530	Erythrina suberosa	122
O 531	Anogeissus latifolia	186
O 532	Bauhinia retusa	141
O 533	Ficus religiosa	335
O 534	Terminalia belerica	180
O 535	Eugenia Jambolana	195
O 536	Schleichera trijuga	96
O 537	Dalbergia Sissoo	126
O 538	Ficus religiosa	335
O 539	Phyllanthus Emblica	352
O 541	Gardenia turgida	228
O 542	Randia uliginosa	227
O 543	Ficus religiosa	335
O 544	Bauhinia Vahlii	139
B 545	Quercus spicata	386
B 546	Hopea odorata	40
B 547	*Pinus Merkusii*	398
B 548	Pterocarpus indicus	xvii
B 549	Garcinia Cowa	24
B 550	Fagræa fragrans	268
B 551	Melanorrhœa usitata	110
B 552	Quercus fenestrata	385
B 553	„ lappacea	386
B 554	Mesua ferrea	27
B 555	Shorea obtusa	39
B 556	„ „	39
B 557	Dillenia *pentagyna*	3
B 559	Hymenodictyon thyrsiflorum	225
B 560	Spondias mangifera	113
B 561	Stephegyne parvifolia	222
B 562	Cocos nucifera	422
B 563	Borassus flabelliformis	417
B 564	Aegle Marmelos	63
B 565	Cratæva religiosa	16
B 569	Podocarpus latifolia	414
B 572	Lagerströmia tomentosa	204
E 573	Sterculia coccinea	47
E 574	Dalbergia stipulata	129
E 575	Cinnamomum Tamala	306
E 576	Michelia Champaca	6
E 577	Alstonia scholaris	262
E 578	Semecarpus Anacardium	112
E 579	Cassia Fistula	137
E 580	Phyllanthus Emblica	352
E 581	Elæocarpus robustus	57
E 582	Oroxylum indicum	275
E 583	Ficus Cunia	339
E 584	Eugenia obovata	194
E 585	Bauhinia purpurea	141
E 586	Ficus	335
E 587	Artocarpus Chaplasha	331
E 588	Ficus comosa	338
E 589	Wendlandia exserta	225
E 590	Bauhinia malabarica	139
E 591	„ variegata	141
E 592	*Machilus odoratissima*	*309*
E 593	Pterospermum acerifolium	49
E 594	Mangifera sylvatica	108
E 595	Quercus spicata	386
E 596	Dillenia indica	3
E 597	Callicarpa arborea	282
E 598	Artocarpus integrifolia	330
E 599	Mallotus philippinensis	361
E 600	Bohmeria rugulosa	325
E 601	Ougeinia dalbergioides	120
H 602	Pinus longifolia	397
H 603	Albizzia stipulata	160
H 604	Acacia Catechu	153
H 605	Ficus cordifolia	335
H 606	„ Roxburghii	340
H 607	„ virgata	338
H 608	Juniperus excelsa	412
H 609	Pinus excelsa	399
H 610	Betula Bhojpattra	372
H 611	„ acuminata	373
H 612	Fraxinus floribunda	257
H 613	Cupressus torulosa	410
H 614	*Buxus sempervirens*	371
H 615	Excœcaria insignis	307
H 616	Cedrus Deodara	406
H 617	„ „	406
E 618	Dalbergia lanceolaria	129
E 619	Bridelia retusa	357
E 620	Sterculia villosa	46
E 621	Premna latifolia	294
E 622	Bassia butyracea	244
E 623	Wrightia tomentosa	264

No.	Name.	Page.	No.	Name.	Page.
E 624	Careya arborea . . .	198	E 686	Acer Campbellii . .	101
E 625	Acacia Catechu . . .	154	E 687	Engelhardtia spicata . .	393
E 626	Castanopsis tribuloides . .	389	E 688	Macropanax undulatum .	210
E 627	Semecarpus Anacardium .	112	E 689	Ficus regia	340
E 628	Cinnamomum glanduliferum	306	E 690	Ehretia Wallichiana . .	273
E 629	Artocarpus Chaplasha . .	331	E 691	Casearia glomerata . .	207
E 630	Lagerströmia Reginæ . .	xxi	E 692	Ilex theæfolia . . .	82
E 631	Dysoxylum procerum . .	72	E 693	Cinnamomum obtusifolium .	305
E 632	Stereospermum chelonoides .	278	E 694	Echinocarpus dasycarpus .	56
E 633	Alseodaphne	307	E 695	Daphniphyllopsis capitata .	81
E 634	Dalbergia Sissoo . . .	127	E 696	Prunus Padus . . .	164
E 635	Shorea robusta . . .	38	E 697	Cryptomeria japonica . .	411
E 636	Schima Wallichii . . .	30	E 698	Pyrularia edulis . . .	321
E 637	Mangifera indica . . .	107	E 699	Bucklandia populnea . .	175
E 638	Aegle Marmelos . . .	63	E 700	Beilschmiedia Roxburghiana.	309
E 639	Cinnamomum glanduliferum	306	E 701	Eugenia Kurzii . . .	194
E 640	Cedrela Toona . . .	79	E 702	Shorea robusta . . .	38
E 642	Cordia Myxa . . .	270	E 703	Canarium bengalense . .	68
E 643	Ficus glomerata . . .	340	E 704	Pinus longifolia . . .	397
E 644	Dysoxylum binectariferum .	71	E 705	Melia dubia . . .	71
E 645	Briedelia retusa . . .	357	E 706	Morus cuspidata . . .	328
E 646	Schima Wallichii . . .	30	E 707	Celtis tetrandra . . .	344
E 647	Albizzia stipulata . .	160	E 708	Gynocardia odorata . .	18
E 648	Garuga pinnata . . .	67	E 709	Dipterocarpus turbinatus .	32
E 649	Turpinia nepalensis . .	102	E 710	Lagerströmia Reginæ . .	203
E 650	Anthocephalus Cadamba .	220	E 711	Amoora Rohituka . .	73
E 651	Grewia vestita . . .	55	E 712	Cedrela Toona . . .	79
E 652	Duabanga sonneratioides .	204	E 713	Duabanga sonneratioides .	204
E 653	Engelhardtia spicata . .	393	E 714	Cordia Myxa . . .	271
E 654	Bischoffia javanica . .	356	E 715	Diospyros cordifolia . .	251
E 655	Cedrela Toona . . .	79	E 716	Ficus	335
E 656	Morus cuspidata . . .	328	E 717	Tetranthera . . .	311
E 657	Michelia excelsa . . .	7	E 718	Alstonia scholaris . .	262
E 658	Dillenia pentagyna . .	3	E 719	Stereospermum . . .	279
E 659	Stereospermum chelonoides .	278	E 720	Dipterocarpus . . .	33
E 660	Albizzia lucida . . .	159	E 721	Artocarpus Chaplasha . .	331
E 661	Odina Wodier . . .	111	E 722	Drimycarpus racemosus .	112
E 662	Terminalia tomentosa . .	184	W 723	Lophopetalum Wightianum .	86
E 663	" belerica . .	180	W 724	Vitex altissima . . .	297
E 664	Eugenia Jambolana . .	195	W 725	Albizzia odoratissima . .	158
E 665	Acacia Catechu . . .	xix	W 726	Lagerströmia Reginæ . .	203
E 666	Lagerströmia parviflora .	201	W 727	Strychnos Nux-vomica . .	269
E 667	Acrocarpus fraxinifolius .	136	W 728	Albizzia Lebbek . . .	157
E 668	Erythrina suberosa . .	122	W 729	Dalbergia latifolia . .	xvii
E 669	Celtis tetrandra . . .	344	W 730	Tectona grandis . . .	293
E 670	Cinnamomum glanduliferum.	306	W 731	Diospyros Ebenum . .	251
E 671	Terminalia Chebula . .	181	W 732	Schleichera trijuga . .	96
E 672	Dalbergia latifolia . .	128	W 733	Calophyllum inophyllum .	25
E 673	Stereospermum chelonoides .	278	W 736	Myristica malabarica . .	314
E 674	Butea frondosa . . .	123	W 740	Artocarpus Lakoocha . .	330
E 675	Dalbergia Sissoo . . .	127	W 741	Mesua ferrea . . .	27
E 676	Gmelina arborea . . .	296	W 742	Pterocarpus Marsupium .	133
E 677	Albizzia lucida . . .	159	W 743	Carallia integerrima . .	178
E 678	Betula cylindrostachys .	373	W 744	Artocarpus hirsuta . .	331
E 679	Bombax malabaricum . .	44	W 745	Hopea parviflora . . .	41
E 680	Mimosa rubicaulis . .	148	W 746	Ailanthus malabarica . .	64
E 681	Castanopsis indica . .	389	W 747	Vateria indica . . .	41
E 682	Eugenia tetragona . .	194	W 748	Albizzia Lebbek . . .	157
E 683	Prunus Puddum . . .	163	W 750	Diospyros Ebenum . .	251
E 684	Acer lævigatum . . .	99	W 751	Albizzia Lebbek . . .	157
E 685	Phyllanthus bicolor . .	353	W 752	Pterocarpus Marsupium .	133

No	Name	Page	No	Name	Page
W 753	Tectona grandis . . .	293	C 823	Bauhinia variegata . .	141
W 754	Xylia dolabriformis . .	149	C 824	Stephegyne parvifolia . .	xxiii
W 755	Terminalia tomentosa . .	184	C 825	Adina cordifolia . . .	221
W 756	Artocarpus Lakoocha . .	330	C 826	Gardenia turgida . . .	228
W 757	Vitex altissima . . .	297	C 827	Bassia latifolia . . .	244
W 758	Artocarpus hirsuta . .	xxvii	C 828	Diospyros Melanoxylon .	249
W 759	Hopea parviflora . .	41	C 829	Schrebera swietenioides .	256
W 761	Xylia dolabriformis . .	149	C 830	Wrightia tomentosa . .	264
W 762	Calophyllum tomentosum .	26	C 831	Cordia Macleodii . .	271
W 763	Cedrela Toona . . .	79	C 832	Stereospermum suaveolens .	279
W 764	Chickrassia tabularis .	76	C 833	Stereospermum chelonoides	278
W 765	Lagerströmia microcarpa .	202	C 834	Tectona grandis . . .	292
W 767	Borassus flabelliformis .	417	C 835	Gmelina arborea . . .	296
W 768	Cocos nucifera . . .	422	C 836	Ficus bengalensis . .	334
W 769	Areca Catechu . . .	421	C 837	„ religiosa . . .	336
H 770	Populus ciliata	379	C 838	„ infectoria . . .	334
H 771	Cupressus torulosa . .	410	C 839	„ glomerata . . .	340
H 772	Juniperus excelsa . .	412	C 840	Briedelia retusa . . .	357
H 773	Taxus baccata . . .	413	C 841	Phyllanthus Emblica . .	352
H 774	Abies Webbiana . . .	409	C 842	Terminalia Chebula . .	181
H 775	„ Smithiana . . .	408	C 843	Acacia arabica . . .	151
H 776	Æsculus indica . . .	95	C 844	„ eburnea . . .	162
H 777	Quercus dilatata . .	xxix	[illegible]	[illegible]	24
H 778	Euonymus Hamiltonianus	84			46
H 779	Olea ferruginea . . .	258			133
H 780	Juglans regia . . .	392			86
H 781	Prunus armeniaca . .	162			128
H 782	Cedrela serrata . . .	79			149
F 783	Cassia Fistula . . .	137			26
E 784	Vitex alata	297			202
E 785	Lagerströmia parviflora .	201			262
F 786	Derris robusta . . .	134	W 864	Cassia Fistula . .	137
F 788	Albizzia stipulata . .	160	W 867	Corypha umbraculifera .	418
F 793	Mesua ferrea . . .	27	W 868	Cocos nucifera . .	422
E 794	Artocarpus Lakoocha . .	330	W 869	Borassus flabelliformis . .	417
F 796	Taxus baccata . . .	413	C 870	Sesbania ægyptiaca . .	118
E 797	Pinus Kasya . . .	398	E 871	„ grandiflora . .	119
F 798	Cinnamomum pauciflorum .	306	F 872	Acacia ferruginea . .	153
E 799	*Myrica sapida* . . .	391	O 873	Shorea robusta . .	38
C 800	Hardwickia binata . .	143	O 874	Terminalia tomentosa .	184
B 801	Tectona grandis . . .	293	O 875	Eugenia Jambolana . .	195
B 802	Pentace burmanica . .	52	F 876	Woodfordia floribunda .	200
B 803	Cedrela Toona . . .	79	F 877	Cycas pectinata . . .	415
B 804	Sandoricum indicum . .	72	F 878	Wallichia disticha . .	420
B 805	Xylia dolabriformis . .	149	E 879	Leea robusta . . .	93
B 806	Artocarpus integrifolia .	330	F 880	Leea sambucina . . .	xv
B 807	Duabanga sonneratioides .	204	P 881	Albizzia Lebbek . . .	157
B 808	Lagerstromia Reginæ . .	203	P 882	Prosopis spicigera . .	147
B 809	Albizzia stipulata . .	160	P 883	Populus euphratica . .	378
B 810	Artocarpus Lakoocha . .	330	P 884	Dalbergia Sissoo . . .	126
B 811	Albizzia procera . . .	159	P 885	Zizyphus flexuosa . .	89
B 812	Garuga pinnata . . .	67	P 886	Tamarix articulata . .	20
B 813	Antiaris toxicaria . .	332	P 887	Phœnix sylvestris . . .	419
B 814	Barringtonia acutangula .	196	P 888	Tamarix dioica . . .	20
B 815	Pentace burmanica . .	52	P 889	Calligonum polygonoides .	303
B 816	Carallia integerrima . .	178	P 890	Acacia arabica . . .	151
B 817	Gardenia obtusifolia . .	229	P 891	Morus indica . . .	328
B 818	Dipterocarpus alatus . .	33	P 892	Capparis aphylla . . .	15
C 820	Erythrina indica . . .	122	P 893	Ficus religiosa . . .	335
C 821	Bauhinia malabarica . .	139	P 894	Dodonæa viscosa . . .	101
C 822	„ purpurea . .	140	H 895	Taxus baccata . . .	413

No.	Name.	Page.	No.	Name.	Page.
H 897	Cedrela serrata	79	C 958	Stereospermum xylocarpum	279
H 898	Pistacia integerrima	107	C 959	Gmelina arborea	296
H 899	Quercus incana	385	C 960	Borassus flabelliformis	417
H 900	Cedrus Deodara	406	E 964	Abies Webbiana	409
H 901	Pinus excelsa	399	E 965	Abies	408
H 902	Cedrus Deodara	406	E 966	Salix	378
H 903	Quercus Ilex	383	E 967	Pyrus baccata	168
H 904	Fraxinus floribunda	257	E 968	Abies dumosa	408
H 905	Parrotia Jacquemontiana	174	E 969	Larix Griffithii	410
H 906	Juniperus excelsa	412	E 970	Populus ciliata	379
H 907	" communis	411	E 972	Cupressus funebris	410
H 908	Corylus Colurna	391	E 973	Ribes glaciale	174
H 909	Betula Bhojpattra	372	E 974	Myricaria germanica	20
P 910	Ficus virgata	338	E 975	Viburnum fœtens	215
P 911	" infectoria	334	E 976	Enkianthus himalaicus	235
P 912	Reptonia buxifolia	241	C 977	Bauhinia Vahlii	xviii
P 913	Celastrus spinosus	87	C 978	Bombax malabaricum	44
P 914	Sageretia Brandrethiana	93	C 979	Butea frondosa	xvii
H 915	Acer cæsium	100	C 980	Careya arborea	197
H 916	Prunus Padus	164	C 981	Ficus bengalensis	334
H 917	Ulmus Wallichiana	341	C 982	" infectoria	334
H 918	Ulmus	342	C 983	Grewia tiliæfolia	55
H 919	Euonymus Hamiltonianus	84	C 984	Sterculia urens	46
H 920	Cedrela serrata	79	C 985	" colorata	47
H 921	Taxus baccata	413	C 986	" villosa	46
H 922	Platanus orientalis	346	C 987	Helicteres Isora	49
H 923	Pinus excelsa	399	C 988	Triumfetta angulata	...
H 924	Cornus macrophylla	212	C 989	Eriolæna Hookeriana	51
H 925	Cotoneaster bacillaris	171	H 990	Buxus sempervirens	371
H 926	Pistacia integerrima	107	H 991	Pinus Gerardiana	398
H 927	Quercus annulata	387	W 992	Randia uliginosa	237
H 928	Olea glandulifera	258	W 993	Gardenia turgida	228
H 929	Machilus odoratissima	309	W 994	Wrightia tomentosa	261
H 930	Buxus sempervirens	371	W 995	Dolichandrone falcata	276
H 931	Acer pictum	101	W 996	Stereospermum xylocarpum	279
H 932	Celtis caucasica	344	W 997	Polyalthia cerasoides	9
H 933	Parrotia Jacquemontiana	174	W 998	Wrightia tomentosa	261
H 934	Abies Webbiana	409	P 1000	Parrotia Jacquemontiana	174
H 935	Quercus dilatata	384	B 1001	Calamus latifolius	423
H 936	Æsculus indica	95	B 1003	" "	423
H 937	Cinnamomum Tamala	305	E 1004	" "	423
H 938	Acacia Catechu	154	E 1016	" inermis	424
P 939	Prosopis spicigera	147	E 1017	" macracanthus	424
H 940	Cedrus Deodara	406	E 1018	" Jenkinsianus	424
P 941	Capparis aphylla	15	B 1026	" arborescens	423
P 942	Salvadora oleoides	260	B 1027	" latifolius	423
P 943	Tectona undulata	275	B 1031	" Guruba	424
P 944	Acacia modesta	153	O 1038	" Rotang	423
P 945	" "	153	B 1041	Korthalsia scaphigera	424
P 946	Melia Azedarach	70	B 1042	Calamus tigrinus	424
P 947	Acacia leucophlœa	152	B 1045	Caryota sobolifera	420
E 948	Gmelina arborea	296	B 1046	Licuala peltata	418
E 949	Albizzia procera	159	E 1049	Michelia Champaca	6
E 950	Duabanga sonneratioides	204	C 1050	Thespesia populnea	43
E 951	Aquilaria Agallocha	316	D 1051	Acacia arabica	151
E 952	Mangifera sylvatica	108	D 1052	Albizzia amara	161
H 953	Quercus Ilex	383	D 1053	Melia indica	70
H 954	Buxus sempervirens	371	D 1054	Cedrela Toona	79
C 955	Dalbergia latifolia	127	D 1055	Hardwickia binata	143
C 956	Lagerströmia lanceolata	201	D 1056	Shorea Talura	34
C 957	Holarrhena antidysenterica	263	D 1058	Vitex pubescens	298

No	Name	Page	No	Name	Page
D 1059	Terminalia tomentosa	184	C 1122	Albizzia odoratissima	158
D 1060	Strychnos potatorum	269	C 1123	Soymida febrifuga	76
D 1061	Pterocarpus Marsupium	133	C 1124	Buchanania latifolia	110
D 1062	Shorea Tumbuggaia	39	C 1125	Terminalia belerica	180
D 1063	Vitex pubescens	298	C 1126	Phyllanthus Emblica	532
D 1064	Hardwickia pinnata	144	C 1127	Hymenodictyon excelsum	225
D 1065	Gluta travancorica	109	C 1128	Zizyphus Jujuba	89
D 1066	Heritiera Papilio	48	C 1129	Gmelina arborea	296
D 1069	Chloroxylon Swietenia	77	C 1130	Morinda exserta	232
D 1070	Stereospermum chelonoides	278	C 1131	Careya arborea	198
D 1071	Zizyphus Jujuba	89	C 1132	Barringtonia acutangula	196
D 1072	Dalbergia latifolia	128	C 1133	Pongamia glabra	133
D 1073	Mimusops Elengi	245	C 1134	Capparis grandis	15
D 1074	Terminalia Chebula	181	C 1135	Eugenia Jambolana	195
D 1075	Pterocarpus santalinus	132	C 1136	Adina cordifolia	221
D 1076	Cassia Fistula	137	C 1137	Bauhinia malabarica	139
D 1077	Terminalia tomentosa	184	C 1138	Ficus glomerata	340
D 1078	Shorea Tumbuggaia	39	C 1139	Dolichandrone falcata	276
D 1079	Gyrocarpus Jacquini	187	C 1140	Lagerströmia parviflora	201
D 1080	Cassia siamea	138	C 1141	Cochlospermum Gossypium	17
D 1081	Acacia ferruginea	153	C 1142	Gardenia turgida	228
D 1082	Alangium Lamarckii	211	C 1143	Anogeissus acuminata	187
D 1083	Erythroxylon monogynum	58	C 1144	Dalbergia lanceolaria	129
D 1084	Albizzia odoratissima	158	C 1145	Erythrina suberosa	122
D 1085	Acrocarpus fraxinifolius	136	C 1146	Dalbergia latifolia	127
D 1086	Pterocarpus Marsupium	133	C 1147	Hardwickia binata	143
D 1087	Tetranthera laurifolia	310	C 1148	Ulmus integrifolia	342
D 1088	Sterculia urens	46	C 1149	Cordia Myxa	270
D 1089	Celtis Wightii	343	C 1150	Ficus bengalensis	334
D 1090	Artocarpus hirsuta	331	C 1151	Xylia dolabriformis	149
D 1091	Erythroxylon monogynum	58	C 1152	Ougeinia dalbergioides	120
D 1092	Shorea Talura	34	C 1153	Chloroxylon Swietenia	77
D 1093	Melia dubia	71	C 1154	Cassia Fistula	137
W 1094	Eucalyptus Globulus	190	C 1155	Ehretia lævis	272
W 1095	„ „	190	C 1156	Ixora parviflora	230
W 1096	„ „	190	C 1157	Semecarpus Anacardium	112
W 1097	„ „	190	C 1158	Holarrhena antidysenterica	263
W 1098	„ „	190	C 1159	Terminalia Chebula	181
W 1099	Acacia dealbata	155	C 1160	Bauhinia retusa	141
W 1100	„ melanoxylon	156	C 1161	Antidesma Ghæsembilla	350
C 1101	Strychnos potatorum	269	C 1162	Celastrus senegalensis	87
C 1102	Sterculia urens	16	C 1163	Kydia calycina	44
C 1103	Odina Wodier	111	[illegible]	[illegible]	[illegible]
C 1104	Terminalia tomentosa	184			
C 1105	Pterocarpus Marsupium	133			
C 1106	Heterophragma Roxburghii	277	[illegible]	Diospyros montana	[illegible]
C 1107	Garuga pinnata	[illegible]	[illegible]	[illegible]	[illegible]
C 1108	Schrebera swietenioides				
C 1109	Saccopetalum tomentosum				
C 1110	Schleichera trijuga				
C 1111	Terminalia Arjuna				
C 1112	Boswellia thurifera				
C 1113	Diospyros Melanoxylon				
C 1114	Stereospermum suaveolens				
C 1115	Dalbergia paniculata				
C 1116	Bassia latifolia				
C 1117	Bombax malabaricum				
C 1118	Acacia leucophlœa				
C 1119	Butea frondosa				
C 1120	Stephegyne parvifolia				
C 1121	Anogeissus latifolia				

No.	Name.	Page.	No.	Name.	Page.
C 1183	Casearia tomentosa	206	C 1250	Pterospermum suberifolium	50
C 1184	Olax scandens	81	C 1251	Eugenia Jambolana	195
C 1185	Gardenia lucida	228	C 1252	Lebedieropsis orbicularis	358
C 1186	Randia uliginosa	227	C 1253	Grewia tiliæfolia	54
W 1187	Vateria indica	41	E 1254	Castanopsis indica	389
W 1188	Terminalia belerica	188	E 1255	Amoora spectabilis	73
W 1189	Albizzia odoratissima	158	E 1256	Salix tetrasperma	376
P 1190	Terminalia belerica	180	E 1257	Dipterocarpus	33
P 1191	Cedrela Toona	79	E 1258	Beilschmiedia Roxburghiana	309
P 1192	Eugenia Jambolana	195	E 1259	Dysoxylum Hamiltonii	72
P 1193	Albizzia Lebbek	157	E 1260	Chickrassia tabularis	76
P 1195	Morus indica	328	E 1261	Amoora Rohituka	73
P 1196	Acacia Catechu	154	E 1262	Quercus lanceæfolia	388
P 1198	„ *arabica*	151	E 1263	*Albizzia procera*	159
P 1200	Bauhinia variegata	141	E 1264	Beilschmiedia Roxburghiana	309
P 1201	Melia Azedarach	70	E 1265	Baccaurea sapida	355
E 1202	Tectona grandis	292	E 1266	Cedrela Toona	79
W 1203	„ „	293	E 1267	Premna longifolia	294
C 1204	„ „	293	E 1268	Michelia oblonga	7
P 1205	Dalbergia Sissoo	126	E 1269	Altingia excelsa	175
W 1206	Tectona grandis	292	E 1270	Alstonia scholaris	262
W 1207	Diospyros Ebenum	251	E 1271	Machilus odoratissima	309
W 1208	Artocarpus hirsuta	331	E 1272	Lagerströmia Reginæ	203
D 1209	Santalum album	322	E 1273	Mesua ferrea	27
O 1210	Shorea robusta	38	E 1274	Dichopsis polyantha	243
O 1211	„ „	38	E 1275	Payena lucida	245
O 1213	„ „	38	E 276	Cynometra polyandra	144
O 1214	„ „	38	E 1277	Podocarpus bracteata	414
O 1215	„ „	38	D 1278	Nephelium Longana	97
W 1216	Tectona grândis	293	D 1279	Calophyllum tomentosum	26
W 1217	„ „	293	D 1280	Terminalia paniculata	182
W 1218	Chickrassia tabularis	76	D 1281	„ tomentosa	184
W 1219	Artocarpus hirsuta	331	D 1282	Anogeissus latifolia	186
W 1220	Lagerströmia lanceolata	201	D 1283	Mimusops indica	246
W 1221	Terminalia paniculata	182	D 1284	Stereospermum	279
W 1222	Xylia dolabriformis	149	E 1285	Duabanga sonneratioides	204
W 1223	Mimusops Elengi	245	E 1286	Hymenodictyon thyrsiflorum	225
W 1224	Strychnos Nux-vomica	269	E 1289	Echinocarpus tiliaceus	56
W 1225	Nauclea elliptica	223	E 1290	(Lauraceæ)	313
W 1226	Ougeinia dalbergioides	120	E 1292	„	313
W 1227	Dalbergia latifolia	128	E 1294	Antiaris	332
E 1228	Lagerströmia Reginæ	203	E 1296	Spondias mangifera	113
E 1229	Cedrela Toona	79	E 1298	Calamus tenuis	423
E 1230	Duabanga sonneratioides	204	E 1299	„ Mastersianus	424
E 1231	Hymenodictyon thyrsiflorum	225	E 1300	„ Jenkinsianus	424
E 1232	Bombax malabaricum	44	C 1301	Diospyros Melanoxylon	249
C 1235	Shorea robusta	38	C 1302	„ „	249
C 1236	Dalbergia latifolia	127	C 1303	Dalbergia latifolia	127
C 1237	Diospyros Melanoxylon	246	C 1304	Chloroxylon Swietenia	77
C 1238	Pterocarpus Marsupium	133	C 1305	Ochna squarrosa	65
C 1239	Chloroxylon Swietenia	77	C 1306	Lebedieropsis orbicularis	358
C 1240	Soymida febrifuga	74	C 1307	Morinda exserta	232
C 1241	Terminalia tomentosa	184	C 1308	Acacia Suma	154
C 1242	Ougeinia dalbergioides	120	C 1309	Gardenia turgida	228
C 1243	Bassia latifolia	244	C 1310	Acacia Suma	154
C 1244	Anogeissus latifolia	186	C 1311	Pterospermum suberifolium	50
C 1245	Adina cordifolia	221	B 1312	Bambusa Brandisii	428
C 1246	Morinda exserta	232	B 1313	„ „	428
C 1247	Terminalia Chebula	181	B 1314	Gigantochloa macrostachya	428
C 1248	Gardenia turgida	228	B 1315	Dendrocalamus membranaceus	430
C 1249	Buchanania latifolia	110	B 1316	Bambusa polymorpha	427

No	Name	Page	No	Name	Page
B 1317	Cephalostachyum pergracile	429	E 1394	Sterculia colorata	47
B 1318	Pseudostachyum Helferi	429	E 1395	Dillenia indica	3
B 1319	Bambusa arundinacea	428	E 1396	Eugenia Jambolana	195
B 1320	Dinochloa Maclellandii	431	E 1397	Briedelia tomentosa	357
B 1321	Bambusa Tulda	427	E 1398	Stereospermum chelonoides	278
B 1322	Dendrocalamus strictus	430	E 1399	Odina Wodier	111
B 1324	„ longispathus				26
E 1325	Melocanna bambusoides				76
E 1327	Bambusa Brandisii				330
E 1328	„ Tulda				399
B 1329	Dendrocalamus giganteus				399
W 1330	Bambusa arundinacea	428	H 1405	„ Gerardiana	398
B 1331	Gigantochloa andamanica	428	H 1406	Quercus Ilex	383
E 1332	Bambusa Balcooa	428	H 1407	Pinus excelsa	399
E 1333	„ Tulda	427	C 1408	Tectona grandis	292
O 1337	„ arundinacea	428	C 1409	„ „	292
O 1338	„ nutans	427	C 1410	Schrebera swietenioides	255
E 1339	Arundinaria falcata	427	C 1411	Stereospermum chelonoides	278
E 1340	Pseudostachyum polymorphum		C 1412	Chloroxylon Swietenia	77
		429	B 1413	Schrebera swietenioides	255
E 1341	Dendrocalamus Hamiltonii	430	B 1414	Odina Wodier	111
B 1346	Tectona grandis	393	B 1416	Ulmus integrifolia	342
P 1347	Dalbergia Sissoo	126	B 1417	Terminalia bialata	182
E 1351	Arundinaria racemosa	426	B 1418	Pterospermum	50
P 1352	Dendrocalamus strictus	430	B 1419	Ulmus integrifolia	342
E 1353	Cephalostachyum capitatum	429	B 1420	Berrya Ammonilla	53
E 1354	Arundinaria racemosa	426	B 1421	Heterophragma adenophylla	277
F 1356	Cinchona officinalis	224	B 1422	Diospyros ehretioides	250
E 1357	„ succirubra	224	B 1423	Vitex alata	298
E 1358	„ Calisaya	224	B 1424	Premna tomentosa	294
D 1360	Santalum album	322	B 1425	Gmelina arborea	296
E 1361	Swietenia Mahagoni	75	B 1427	Albizzia odoratissima	158
O 1362	Amoora Rohituka	73	B 1428	Cordia fragrantissima	271
O 1363	Casearia tomentosa	206	B 1429	Vitex pubescens	298
O 1365	Ficus Cunia	339	B 1431	Briedelia retusa	357
O 1366	Randia dumetorum	227	F 1432	Bombax malabaricum	44
O 1367	Tetranthera monopetala	310	F 1433	Anthocephalus Cadamba	219
O 1368	Antidesma diandrum	350	E 1434	Dysoxylum procerum	72
O 1369	Sponia politoria	345	E 1435	Gmelina arborea	296
O 1370	Wendlandia exserta	225	E 1436	Duabanga sonneratioides	204
O 1371	Psidium Guava	190	F 1437	Michelia Champaca	6
O 1372	Gmelina arborea	296	E 1438	Quercus lamellosa	388
O 1373	Tetranthera laurifolia	310	E 1439	„ annulata	387
O 1374	Bischoffia javanica	356	E 1440	Shorea robusta	38
O 1375	Briedelia montana	357	F 1441	Careya arborea	198
O 1376	Cordia Myxa	270	E 1442	Michelia excelsa	7
O 1377	Gardenia turgida	228	E 1443	Quercus annulata	387
P 1379	Acacia arabica	151	F 1444	„ spicata	386
P 1380	Prosopis spicigera	147	E 1445	„ „	386
P 1381	Salvadora persica	259	E 1446	Eugenia tetragona	194
P 1382	„ oleoides	260	E 1447	Prunus Puddum	163
P 1384	Populus euphratica				388
B 1385	Tectona grandis				30
B 1386	Pentace burmanica				268
B 1387	Cinnamomum				143
P 1388	Tamarix dioica				53
F 1389	Garuga pinnata				157
E 1390	Gmelina arborea				154
E 1391	Adina sessilifolia				51
F 1392	Vitex leucoxylon				296
E 1393	„ alata				296

No.	Name.	Page.	No.	Name.	Page.
O 1458	Randia uliginosa . .	227	B 1978	Ochna andamanica . .	65
O 1459	Putranjiva Roxburghii .	353	B 1979	Evodia triphylla . . .	60
O 1460	Dalbergia Sissoo . . .	126	B 1982	Terminalia citrina . .	181
O 1461	Randia dumetorum . .	227	B 1983	„ Catappa . .	182
O 1462	Hymenodictyon excelsum .	225	B 1985	Ceriops Candolleana . .	176
O 1463	Gardenia turgida . .	228	B 1986	Walsura robusta . . .	133
O 1464	Antidesma diandrum . .	350	B 1987	Timonius flavescens . .	219
O 1465	Salix tetrasperma . .	376	B 1988	Allophyllus Cobbe . .	94
E 1466	Dendrocalamus Hamiltonii .	xxx	B 1990	Fagræa racemosa . .	268
D 1475	Borassus flabelliformis .	417	B 1991	Diospyros pyrrhocarpa .	252
D 1476	Dalbergia latifolia . .	xvii	B 1992	Calophyllum spectabile .	25
O 1477	Putranjiva Roxburghii .	353	B 1993	Barringtonia racemosa .	197
O 1478	Streblus asper . . .	327	B 1995	Duabanga sonneratioides .	204
O 1479	Careya arborea . . .	198	B 1997	Diospyros undulata . .	253
O 1480	Briedelia retusa . . .	356	B 1998	Diplospora singularis . .	219
O 1481	Stephegyne parvifolia . .	222	C 2000	Lawsonia alba . . .	200
O 1482	Hymenodictyon excelsum .	225	D 2008	Diospyros Melanoxylon .	249
O 1483	Gmelina arborea . . .	296	D 2014	Tamarindus indica . .	143
O 1484	Tetranthera laurifolia . .	310	D 2025	Hardwickia binata . .	143
O 1485	Salix tetrasperma . .	376	D 2027	Erythroxylon monogynum .	58
O 1486	Dalbergia Sissoo . . .	126	D 2044	Dalbergia latifolia . .	127
O 1487	Randia uliginosa . .	227	D 2045	Diospyros Melanoxylon .	249
O 1488	„ dumetorum . .	227	D 2052	Cassia Fistula . . .	136
O 1489	Gardenia turgida . .	228	D 2053	Mangifera indica . .	107
O 1491	Adina cordifolia . . .	220	D 2066	Pterocarpus santalinus .	32
O 1492	Diospyros Melanoxylon .	249	D 2113	Soymida febrifuga . .	76
O 1493	Bassia latifolia . . .	244	E 2186	Artocarpus Chaplasha .	331
E 1494	Dichopsis polyantha . .	243	E 2187	Cinnamomum glanduliferum	306
E 1497	Spondias mangifera . .	113	E 2188	Lagerströmia Reginæ . .	203
E 1499	Duabanga sonneratioides .	204	E 2189	Dysoxylum Hamiltonii .	72
B 1500	Carallia integerrima . .	178	E 2190	Mesua ferrea . . .	27
E 1530	Nipa fruticans . . .	425	E 2191	Bischoffia javanica . .	356
E 1728	Livistona Jenkinsiana . .	418	E 2192	Amoora spectabilis . .	73
E 1729	„ „ . .	418	E 2193	Gmelina arborea . . .	296
E 1730	„ „ . .	418	E 2194	Albizzia procera . . .	159
E 1731	„ „ . .	418	E 2195	Michelia Champaca . .	6
P 1779	Chamærops Ritchieana .	418	E 2196	Morus cuspidata . . .	328
B 1944	Shorea stellata . . .	34	E 2197	Terminalia citrina . .	181
B 1945	Cinnamomum . . .	307	E 2199	Eugenia mangifolia . .	195
B 1946	„ . . .	307	B 2201	Hopea odorata . . .	40
B 1947	Lophopetalum Wallichii .	86	B 2202	Lagerströmia hypoleuca .	204
B 1948	Aquilaria Agallocha . .	316	B 2203	Diospyros Kurzii . . .	250
B 1949	(Anonaceæ)	10	B 2204	Artocarpus Chaplasha . .	331
B 1950	Santalum	322	B 2206	Garcinia	23
E 1951	Brownlowia	51	B 2207	Pterocarpus indicus . .	130
E 1952	Dichopsis polyantha . .	243	B 2208	Albizzia Lebbek . . .	157
E 1953	Ficus Cunia . . .	339	B 2209	Afzelia bijuga . . .	142
E 1955	Albizzia procera . . .	159	B 2210	Carallia integerrima . .	178
E 1956	„ stipulata . .	160	B 2211	Artocarpus Chaplasha . .	331
E 1957	Mangifera indica . .	107	B 2212	Mimusops littoralis . .	245
E 1958	Eugenia Jambolana . .	195	B 2213	Bouea burmanica . .	108
E 1959	Stereospermum suaveolens .	279	B 2215	Bombax insignis . .	45
E 1960	Dipterocarpus . . .	33	B 2216	Dipterocarpus turbinatus .	32
E 1961	Bombax malabaricum . .	44	B 2217	Bruguiera	177
E 1962	Excæcaria baccata . .	367	B 2218	Vitex leucoxylon . .	298
E 1964	Swintonia Schwenckii . .	104	B 2221	Albizzia stipulata . .	160
E 1965	Odina Wodier . . .	111	B 2222	Bruguiera . . .	177
B 1969	Scolopia rhinanthera . .	17	B 2223	Erythrina indica . .	122
B 1971	Guettarda speciosa . .	229	B 2224	Mimusops Elengi . .	245
B 1975	Prunus martabanica . .	164	B 2225	Bursera serrata . . .	68
B 1977	Picrasma javanica . .	64	B 2226	Heritiera littoralis . .	48

No	Name	Page	No	Name	Page
B 2227	Anacardium occidentale .	108	E 2311	Dillenia pentagyna	3
B 2228	Careya arborea	198	E 2312	Michelia excelsa .	7
B 2229	Anacardium occidentale	108	F 2313	„ Champaca	6
B 2230	Dalbergia purpurea	128	E 2314	„ Cathcartii .	6
B 2231	Albizzia odoratissima	158	E 2315	Terminalia myriocarpa	185
B 2232	Diospyros	252	E 2316	Miliusa Roxburghiana	10
B 2233	Nauclea rotundifolia	223	B 2317	Anona squamosa .	9
B 2234	Stereospermum .	279	F 2318	Berberis nepalensis	13
B 2235	„	279	E 2319	Eurya symplocina	28
B 2236	(Anonaceæ)	11	F 2320	„ acuminata	29
B 2238	Mesua ferrea	27	F 2321	Saurauja napaulensis	29
B 2239	Carapa moluccensis	74	E 2322	Shorea robusta	38
B 2240	Rhizophora mucronata	176	E 2323	Bombax malabaricum	44
B 2241	Mimusops Elengi	245	E 2324	Sterculia villosa	46
B 2243	Dipterocarpus alatus	33	E 2325	Grewia vestita .	56
B 2244	Diospyros pyrrhocarpa	252	E 2326	Eriolæna Wallichii	50
B 2245	Dillenia pilosa .	4	E 2327	Grewia multiflora	56
B 2246	Antidesma Ghæsembilla	350	E 2329	Zanthoxylum alatum	61
B 2247	Albizzia procera	159			viii
B 2248	Lophopetalum Wallichii	86	F 2330	Skimmia Laureola	61
B 2249	Millettia	118	E 2331	Amoora Rohituka	73
B 2250	Dysoxylum	72	E 2332	Cedrela Toona	79
B 2251	(Anonaceæ)	11	F 2333	„ „	79
B 2252	Dolichandrone Rheedii	277	E 2334	Celastrus paniculatus	86
B 2253	Dillenia aurea	4	E 2335	Elæodendron Roxburghii	88
B 2255	Dysoxylum	72	E 2336	Zizyphus rugosa	90
B 2256	Eugenia grandis	193	F 2337	Acer Campbellii .	101
B 2257	Calophyllum inophyllum	25	F 2338	„ Hookeri .	99
B 2258	„ „	52	F 2339	Meliosma simplicifolia	103
B 2259	Sapindus . .	96	F 2340	Rhus semialata	105
B 2260	Cassia .	138	E 2341	Semecarpus Anacardium	112
B 2261	Dolichandrone stipulata	276	E 2342	Odina Wodier	110
B 2263	Calophyllum inophyllum	25	F 2343	Erythrina indica .	122
B 2265	Podocarpus bracteata	414	E 2344	„ stricta .	122
B 2273	Rhizophora mucronata .	176	E 2345	Butea frondosa .	123
B 2274	Lagerströmia hypoleuca	204	E 2346	Dalbergia lanceolaria	129
B 2275	Dillenia pilosa	4	F 2347	„ Sissoo	127
B 2278	Ficus retusa .	336	F 2348	„ latifolia .	127
B 2281	Polyalthia Jenkinsii .	10	F 2349	„ stipulata	129
B 2282	Vatica lanceæfolia	34	F 2350	Bauhinia malabarica	139
B 2283	Lagerströmia hypoleuca	204	F 2351	„ variegata	141
B 2284	Avicennia officinalis	300	F 2352	Cassia Fistula	136
B 2285	Heritiera littoralis	48	F 2353	Tamarindus indica	143
B 2286	Tetranthera laurifolia	310	F 2354	Mimosa rubicaulis	148
B 2287	Hymenodictyon thyrsiflorum	225	F 2355	Acacia Catechu .	154
B 2288	Nauclea rotundifolia	223	F 2356	„ „	154
B 2289	Artocarpus Chaplasha	331	F 2357	„ ferruginea	153
B 2292	Eugenia	195	E 2358	„ pinnata .	155
B 2294	Fagræa racemosa	268	F 2359	„ Intsia	157
B 2295	Cassia	138			xix
B 2300	Lophopetalum littorale	85	F 2360	Albizzia odoratissima	158
B 2301	Artocarpus Chaplasha	331	F 2361	„ procera	159
B 2302	Mangifera indica	107	F 2362	„ stipulata	160
F 2303	Gmelina arborea	[illegible]	F 2363	Prunus Puddum	163
F 2304	Cinnamomum glanduliferum	306	F 2364	„ „ .	163
F 2305	Morus cuspidata	325	F 2365	Eriobotrya dubia .	167
F 2306	„ „ .	[illegible]	F 2366	Rosa sericea .	167
D 2307	Santalum album	[illegible]	F 2367	Rubus ellipticus	[illegible]
F 2308	Plecospermum spinosum	327	F 2368	„ lasiocarpus	[illegible]
F 2309	Mesua ferrea	27	F 2369	Prunus Padus	[illegible]
F 2310	Dillenia indica . .	3	E 2370	Hydrangea robusta	172

No.	Name.	Page.	No.	Name.	Page.
O 1458	Randia uliginosa	227	B 1978	Ochna andamanica	65
O 1459	Putranjiva Roxburghii	353	B 1979	Evodia triphylla	60
O 1460	Dalbergia Sissoo	126	B 1982	Terminalia citrina	181
O 1461	Randia dumetorum	227	B 1983	„ Catappa	182
O 1462	Hymenodictyon excelsum	225	B 1985	Ceriops Candolleana	176
O 1463	Gardenia turgida	228	B 1986	Walsura robusta	133
O 1464	Antidesma diandrum	350	B 1987	Timonius flavescens	219
O 1465	Salix tetrasperma	376	B 1988	Allophyllus Cobbe	94
E 1466	Dendrocalamus Hamiltonii	xxx	B 1990	Fagræa racemosa	268
D 1475	Borassus flabelliformis	417	B 1991	Diospyros pyrrhocarpa	252
D 1476	Dalbergia latifolia	xvii	B 1992	Calophyllum spectabile	25
O 1477	Putranjiva Roxburghii	353	B 1993	Barringtonia racemosa	197
O 1478	Streblus asper	327	B 1995	Duabanga sonneratioides	204
O 1479	Careya arborea	198	B 1997	Diospyros undulata	253
O 1480	Briedelia retusa	356	B 1998	Diplospora singularis	219
O 1481	Stephegyne parvifolia	222	C 2000	Lawsonia alba	200
O 1482	Hymenodictyon excelsum	225	D 2008	Diospyros Melanoxylon	249
O 1483	Gmelina arborea	296	D 2014	Tamarindus indica	143
O 1484	Tetranthera laurifolia	310	D 2025	Hardwickia binata	143
O 1485	Salix tetrasperma	376	D 2027	Erythroxylon monogynum	58
O 1486	Dalbergia Sissoo	126	D 2044	Dalbergia latifolia	127
O 1487	Randia uliginosa	227	D 2045	Diospyros Melanoxylon	249
O 1488	„ dumetorum	227	D 2052	Cassia Fistula	136
O 1489	Gardenia turgida	228	D 2053	Mangifera indica	107
O 1491	Adina cordifolia	220	D 2066	Pterocarpus santalinus	32
O 1492	Diospyros Melanoxylon	249	D 2113	Soymida febrifuga	76
O 1493	Bassia latifolia	244	E 2186	Artocarpus Chaplasha	331
E 1494	Dichopsis polyantha	243	E 2187	Cinnamomum glanduliferum	306
E 1497	Spondias mangifera	113	E 2188	Lagerstròmia Reginæ	203
E 1499	Duabanga sonneratioides	204	E 2189	Dysoxylum Hamiltonii	72
B 1500	Carallia integerrima	178	E 2190	Mesua ferrea	27
E 1530	Nipa fruticans	425	E 2191	Bischoffia javanica	356
E 1728	Livistona Jenkinsiana	418	E 2192	Amoora spectabilis	73
E 1729	„ „	418	E 2193	Gmelina arborea	296
E 1730	„ „	418	E 2194	Albizzia procera	159
E 1731	„ „	418	E 2195	Michelia Champaca	6
P 1779	Chamærops Ritchieana	418	E 2196	Morus cuspidata	328
B 1944	Shorea stellata	34	E 2197	Terminalia citrina	181
B 1945	Cinnamomum	307	E 2199	Eugenia mangifolia	195
B 1946	„	307	B 2201	Hopea odorata	40
B 1947	Lophopetalum Wallichii	86	B 2202	Lagerstromia hypoleuca	204
B 1948	Aquilaria Agallocha	316	B 2203	Diospyros Kurzii	250
B 1949	(Anonaceæ)	10	B 2204	Artocarpus Chaplasha	331
B 1950	Santalum	322	B 2206	Garcinia	23
E 1951	Brownlowia	51	B 2207	Pterocarpus indicus	130
E 1952	Dichopsis polyantha	243	B 2208	Albizzia Lebbek	157
E 1953	Ficus Cunia	339	B 2209	Afzelia bijuga	142
E 1955	Albizzia procera	159	B 2210	Carallia integerrima	178
E 1956	„ stipulata	160	B 2211	Artocarpus Chaplasha	331
E 1957	Mangifera indica	107	B 2212	Mimusops littoralis	245
E 1958	Eugenia Jambolana	195	B 2213	Bouea burmanica	108
E 1959	Stereospermum suaveolens	279	B 2215	Bombax insignis	45
E 1960	Dipterocarpus	33	B 2216	Dipterocarpus turbinatus	32
E 1961	Bombax malabaricum	44	B 2217	Bruguiera	177
E 1962	Excæcaria baccata	367	B 2218	Vitex leucoxylon	298
E 1964	Swintonia Schwenckii	104	B 2221	Albizzia stipulata	160
E 1965	Odina Wodier	111	B 2222	Bruguiera	177
B 1969	Scolopia rhinanthera	17	B 2223	Erythrina indica	122
B 1971	Guettarda speciosa	229	B 2224	Mimusops Elengi	245
B 1975	Prunus martabanica	164	B 2225	Bursera serrata	68
B 1977	Picrasma javanica	64	B 2226	Heritiera littoralis	48

No	Name	Page	No	Name	Page
B 2227	Anacardium occidentale .	108	E 2311	Dillenia pentagyna .	3
B 2228	Careya arborea . .	198	E 2312	Michelia excelsa . .	7
B 2229	Anacardium occidentale .	108	F 2313	,, Champaca .	6
B 2230	Dalbergia purpurea	128	E 2314	,, Cathcartii .	6
B 2231	Albizzia odoratissima .	158	E 2315	Terminalia myriocarpa	185
B 2232	Diospyros	252	E 2316	Miliusa Roxburghiana	10
B 2233	Nauclea rotundifolia .	223	B 2317	Anona squamosa . .	9
B 2234	Stereospermum .	279	E 2318	Berberis nepalensis .	13
B 2235	,, . .	279	E 2319	Eurya symplocina	28
B 2236	(Anonaceæ) .	11	E 2320	,, acuminata	29
B 2238	Mesua ferrea .	27	F 2321	Saurauja napaulensis .	29
B 2239	Carapa moluccensis .	74	E 2322	Shorea robusta . .	38
B 2240	Rhizophora mucronata	176	E 2323	Bombax malabaricum . .	41
B 3241	Mimusops Elengi . .	245	E 2324	Sterculia villosa .	46
B 2243	Dipterocarpus alatus	33	E 2325	Grewia vestita . .	56
B 2244	Diospyros pyrrhocarpa .	252	E 2326	Eriolæna Wallichii . .	50
B 2245	Dillenia pilosa . .	4	E 2327	Grewia multiflora	56
B 2246	Antidesma Ghœsembilla .	350	E 2329	Zanthoxylum alatum .	61
B 2247	Albizzia procera .	159			viii
B 2248	Lophopetalum Wallichii .	86	F 2330	Skimmia Laureola	61
B 2249	Millettia . . .	118	E 2331	Amoora Rohituka .	73
B 2250	Dysoxylum .	72	F 2332	Cedrela Toona . .	79
B 2251	(Anonaceæ) . .	11	F 2333	,, ,, . .	79
B 2252	Dolichandrone Rheedii	[illegible]	[illegible]	[illegible]	86
B 2253	Dillenia aurea . .	[illegible]	[illegible]	[illegible]	88
B 2255	Dysoxylum . .	[illegible]	[illegible]	[illegible]	90
B 2256	Eugenia grandis	[illegible]	[illegible]	[illegible]	101
B 2257	Calophyllum inophyllum	[illegible]	[illegible]	[illegible]	99
B 2258	,, ,,	[illegible]	[illegible]	[illegible]	103
B 2259	Sapindus . . .	[illegible]	[illegible]	[illegible]	105
B 2260	Cassia .	[illegible]	[illegible]	[illegible]	112
B 2261	Dolichandrone stipulata	[illegible]	[illegible]	[illegible]	110
B 2263	Calophyllum inophyllum	[illegible]	[illegible]	[illegible]	122
B 2265	Podocarpus bracteata . .	411	E 2344	,, stricta . .	122
B 2273	Rhizophora mucronata .	176	E 2345	Butea frondosa . .	123
B 2274	Lagerströmia hypoleuca .	204	E 2346	Dalbergia lanceolaria . .	129
B 2275	Dillenia pilosa . .	4	E 2347	,, Sissoo . .	127
B 2278	Ficus retusa . . .	336	E 2348	,, latifolia .	127
B 2281	Polyalthia Jenkinsii . .	10	E 2349	,, stipulata .	129
B 2282	Vatica lanceæfolia . .	34	F 2350	Bauhinia malabarica . .	130
B 2283	Lagerströmia hypoleuca	204	E 2351	,, variegata . .	141
B 2284	[illegible]	[illegible]	E 2352	Cassia Fistula . .	[illegible]
			E 2353	Tamarindus indica	143
			E 2354	Mimosa rubicaulis .	148
			E 2355	Acacia Catechu .	154
B 2288	Nauclea rotundifolia . .	223	E 2356	,, ,, .	154
B 2289	Artocarpus Chaplasha . .	331	E 2357	,, ferruginea	[illegible]
B 2292	Eugenia . . .	195	E 2358	,, pinnata . .	[illegible]
B 2294	Lagræa racemosa . .	268	E 2359	,, Intsia	[illegible]
B 2295	Cassia	138			[illegible]
B 2300	Lophopetalum littorale	85	E 2360	Albizzia odoratissima	[illegible]
B 2301	Artocarpus Chaplasha .	331	E 2361	,, procera .	[illegible]
B 2302	Mangifera indica . .	107	F 2362	,, stipulata	[illegible]
F 2303	Gmelina arborea .	[illegible]	E 2363	Prunus Puddum .	[illegible]
F 2304	Cinnamomum glanduliferum	306	E 2364	,, ,, .	[illegible]
F 2305	Morus cuspidata .	[illegible]	E 2365	Eriobotrya dubia .	[illegible]
F 2306	,, ,, . .	[illegible]	E 2366	[illegible] . .	[illegible]
D 2307	Santalum album . .	[illegible]	E 2367	Rubus ellipticus . .	[illegible]
F 2308	Plecospermum spinosum .	[illegible]	E 2368	,, lasiocarpus .	[illegible]
E 2309	Mesua ferrea . . .	27	F 2369	Prunus Padus . .	[illegible]
F 2310	Dillenia indica . . .	3	E 2370	Hydrangea robusta .	[illegible]

No.	Name.	Page.	No.	Name.	Page.
E 2371	Dichroa febrifuga	172	E 2428	Briedelia retusa	356
E 2372	Bucklandia populnea	175	E 2429	Homonoya symphylliæfolia	364
E 2373	„ „	175	E 2430	Antidesma Bunias	350
E 2374	Terminalia Chebula	181	E 2431	Antidesma Menasu	350
E 2375	„ tomentosa	184	E 2432	Phyllanthus Emblica	352
E 2376	„ myriocarpa	185	E 2433	„ bicolor	353
E 2377	Eugenia Jambolana	195	E 2434	„ Thomsoni	353
E 2378	Careya arborea	198	E 2435	Pinus longifolia	397
E 2379	Lagerströmia parviflora	201	E 2436	„ „	397
E 2380	Duabanga sonneratioides	204	E 2437	Abies Webbiana	409
E 2381	Casearia glomerata	207	E 2438	Juniperus recurva	412
E 2382	Brassaiopsis mitis	210	E 2439	Cycas pectinata	415
E 2383	Aucuba himalaica	213	E 2440	Juglans regia	392
E 2384	Viburnum erubescens	215	E 2441	„ „	393
E 2385	Stephegyne	223	E 2442	Engelhardtia spicata	393
E 2386	Randia dumetorum	227	E 2443	Böhmeria rugulosa	325
E 2387	Adina cordifolia	221	E 2444	Artocarpus integrifolia	330
E 2388	Rhododendron arboreum	236	E 2445	„ Lakoocha	330
E 2389	Mæsa montana	239	E 2446	Sponia orientalis	345
E 2390	Symplocos lucida	254	E 2447	Pouzolzia viminea	325
E 2391	„	254	E 2448	Plecospermum spinosum	327
E 2392	Tabernæmontana coronaria	263	E 2449	Ficus elastica	338
E 2393	Buddleia Colvillei	267	E 2450	„ hispida	340
E 2394	Cordia Myxa	271	E 2451	Quercus annulata	387
E 2395	Oroxylum indicum	275	E 2452	„ lamellosa	388
		xxvi	E 2453	„ „	388
E 2396	Gmelina arborea	296	E 2454	„ pachyphylla	386
E 2397	Callicarpa arborea	292	E 2455	„ „	386
E 2398	„ „	294	E 2456	„ acuminata	386
E 2399	Premna latifolia	294	E 2457	Castanopsis rufescens	389
E 2400	„ longifolia	294	E 2458	Borassus flabelliformis	417
E 2401	Clerodendron Colebrookianum	299	E 2459	Caryota urens	420
E 2402	Caryopteris Wallichiana	299	E 2460	Wallichia disticha	420
E 2403	Betula Bhojpattra	372	E 2461	Livistona Jenkinsiana	418
		xxix	E 2462	Pandanus furcatus	425
E 2404	„ acuminata	373	E 2463	Pinus excelsa	399
		xxix	E 2464	Quercus	383
E 2405	Alnus nepalensis	374	E 2465	Casuarina equisitifolia	346
		xxix	E 2466	Cocculus laurifolius	12
E 2406	Pyrularia edulis	321	E 2467	Bischoffia javanica	356
E 2407	Elæagnus latifolia	317	E 2468	Trewia nudiflora	360
E 2408	Daphne papyracea	315	E 2469	Putranjiva Roxburghii	353
E 2402	Helicia robusta	318	B 2470	Thespesia populnea	43
E 2410	Phlogacanthus thyrsiflorus	281	B 2472	Maba andamanica	253
E 2411	Teucrium macrostachyum	302	B 2474	Cleistanthus myrianthus	357
E 2412	Polygonum molle	303	B 2475	Macaranga indica	363
E 2413	Cinnamomum glanduliferum	306	B 2476	Mallotus muricatus	362
E 2414	Machilus odoratissima	308	B 2477	Excæcaria Agallocha	368
E 2415	Phœbe lanceolata	308	O 2478	Samara robusta	240
E 2416	„ attenuata	308	E 2479	Polyalthia longifolia	9
E 2417	Daphnidium pulcherrimum	312	B 2480	Dipterocarpus tuberculatus	33
E 2418	„ elongatum	312	B 2481	Shorea stellata	34
E 2419	Beilschmiedia Roxburghiana	309	B 2482	Cinnamomum	307
E 2420	Litsœa consimilis	311	B 2483	„	307
E 2421	Mallotus philippinensis	361	B 2484	Dysoxylum	72
E 2422	„ albus	361	B 2485	Aquilaria Agallocha	316
E 2423	„ Roxburghianus	362	E 2486	Aegle Marmelos	63
E 2424	Macaranga indica	363	E 2487	Feronia Elephantum	63
E 2425	„ denticulata	363	E 2488	Thespesia populnea	43
E 2426	Macaranga gummiflua	363	E 2489	Santalum album	322
E 2427	Jatropha Curcas	365	E 2490	Calophyllum polyanthum	26

No	Name.	Page	No	Name	Page
B 2491	Mesua ferrea	27	B 2552	Baccaurea sapida	355
B 2492	Garcinia speciosa	23	B 2553	Artocarpus Lakoocha	330
B 2493	„	23	B 2554	„ Chaplasha	331
B 2494	Pterocarpus indicus	130	B 2555	Dipterocarpus turbinatus	32
B 2495	Planchonia littoralis	198	B 2556	*Podocarpus bracteata*	414
B 2496	Lagerstroemia hypoleuca	204	B 2683	Artocarpus Chaplasha	331
B 2497	Mimusops littoralis	246	B 2685	Careya arborea	198
B 2498	*Diospyros Kurzii*	250	B 2686	Baccaurea sapida	355
B 2499	Artocarpus Chaplasha	331	B 2687	Isonandra obovata	242
B 2500	Garcinia	23	B 2690	Morinda exserta	232
B 2501	Dillenia indica	3	B 2691	Cinnamomum	307
B 2502	„ aurea	4	B 2692	Homalium tomentosum	207
B 2504	Mesua ferrea	27	B 2693	*Artocarpus Chaplasha*	331
B 2505	Dipterocarpus tuberculatus	33	B 2695	Cinnamomum	307
B 2506	„ lævis	32	B 2696	Stereospermum xylocarpum	279
B 2507	Shorea siamensis	30	B 2697	*Dalbergia cultrata*	128
B 2508	Vatica lanceæfolia	34	B 2698	Hopea odorata	40
B 2509	Hopea odorata	40	B 2699	Homalium tomentosum	207
B 2510	Pterospermum acerifolium	49	B 2700	*Mesua ferrea*	27
B 2511	„ semi sagittatum	50	B 2702	Homalium tomentosum	207
B 2512	*Eriolæna Candollei*	51	B 2703	Careya arborea	198
B 2513	Lophopetalum littorale	85	B 2704	Altingia excelsa	175
B 2514	Carapa moluccensis	74	B 2705	Albizzia	161
B 2515	Schleichera trijuga	96	B 2706	Pterospermum semi sagittatum	50
B 2516	Chickrassia tabularis	76	B 2708	Pterocarpus indicus	130
B 2517	Odina Wodier	111	B 2709	*Tectona grandis*	293
B 2518	Melanorrhœa usitata	110	B 2710	Careya arborea	197
B 2519	Mangifera caloneura	107	B 2711	Vitex leucoxylon	298
B 2520	Millettia pendula	118	B 2712	Cassia siamea	138
B 2521	Dalbergia cultrata	128	B 2713	Eugenia grandis	193
B 2522	„ nigrescens	129	B 2714	Hopea odorata	40
B 2523	„ *purpurea*	128	B 2715	Quercus lappacea	86
B 2524	Pterocarpus indicus	130	B 2716	Hopea odorata	310
B 2525	Cassia Fistula	136	B 2717	*Lagerstrœmia Reginæ*	203
B 2526	„ *siamea*	138	B 2718	Premna tomentosa	294
B 2527	Albizzia procera	159	B 2719	Cinnamomum	307
B 2528	„ stipulata	160	B 2720	Baccaurea sapida	355
B 2529	Acacia	153	B 2721	Rhizophora mucronata	176
B 2530	Carallia integerrima	178	B 2722	Berrya Ammonilla	57
B 2531	Terminalia *tomentosa*	184	B 2728	Dalbergia cultrata	128
B 2532	„ belerica	180	P 2729	Olea ferruginea	258
B 2533	Lagerstroemia tomentosa	[illegible]	[illegible]	[illegible]	244
B 2534	*Homalium tomentosum*	[illegible]	[illegible]	[illegible]	127
B 2535	Anthocephalus Cadamba	[illegible]	[illegible]	[illegible]	229
B 2536	Nauclea rotundifolia	[illegible]	[illegible]	[illegible]	263
B 2537	Adina sessilifolia	[illegible]	[illegible]	[illegible]	201
B 2538	„ cordifolia	[illegible]	[illegible]	[illegible]	90
B 2539	Stephegyne parvifolia	[illegible]	[illegible]	[illegible]	189
B 2540	Gardenia costata	[illegible]	[illegible]	[illegible]	352
B 2541	Diospyros cordifolia	[illegible]	[illegible]	[illegible]	18
B 2542	„ ehretioides	[illegible]	[illegible]	[illegible]	159
B 2543	Cordia Myxa	271	C 2741	[illegible]	133
B 2544	Dolichandrone stipulata	279	C 2742	Chloroxylon Swietenia	77
B 2545	„ Rheedii	277	C 2743	Terminalia tomentosa	184
B 2546	Stereospermum chelonoides	278	C 2744	Anogeissus latifolia	186
B 2547	Heterophragma sulfurea	277	C 2745	Stereospermum suaveolens	279
B 2548	Premna tomentosa	294	C 2746	Semecarpus Anacardium	112
B 2549	Vitex leucoxylon	298	C 2747	Careya arborea	198
B 2550	Vitex pubescens	298	C 2748	Albizzia odoratissima	158
B 2551	Tectona grandis	293	C 2749	Lagerstroemia parviflora	201

No.	Name.	Page.	No.	Name.	Page.
E 2371	Dichroa febrifuga . .	172	E 2428	Briedelia retusa . . .	356
E 2372	Bucklandia populnea . .	175	E 2429	Homonoya symphylliæfolia .	364
E 2373	„ „ . .	175	E 2430	Antidesma Bunias . .	350
E 2374	Terminalia Chebula . .	181	E 2431	Antidesma Menasu . .	350
E 2375	„ tomentosa . .	184	E 2432	Phyllanthus Emblica . .	352
E 2376	„ myriocarpa . .	185	E 2433	„ bicolor . .	353
E 2377	Eugenia Jambolana . .	195	E 2434	„ Thomsoni . .	353
E 2378	Careya arborea . . .	198	E 2435	Pinus longifolia . . .	397
E 2379	Lagerströmia parviflora .	201	E 2436	„ „ . . .	397
E 2380	Duabanga sonneratioides .	204	E 2437	Abies Webbiana . . .	409
E 2381	Casearia glomerata . .	207	E 2438	Juniperus recurva . .	412
E 2382	Brassaiopsis mitis . .	210	E 2439	Cycas pectinata . . .	415
E 2383	Aucuba himalaica . .	213	E 2440	Juglans regia . . .	392
E 2384	Viburnum erubescens . .	215	E 2441	„ „ . . .	393
E 2385	Stephegyne	223	E 2442	Engelhardtia spicata . .	393
E 2386	Randia dumetorum . .	227	E 2443	Böhmeria rugulosa . .	325
E 2387	Adina cordifolia . . .	221	E 2444	Artocarpus integrifolia .	330
E 2388	Rhododendron arboreum .	236	E 2445	„ Lakoocha . .	330
E 2389	Mæsa montana . . .	239	E 2446	Sponia orientalis . . .	345
E 2390	Symplocos lucida . .	254	E 2447	Pouzolzia viminea . .	325
E 2391	„ „ . . .	254	E 2448	Plecospermum spinosum .	327
E 2392	Tabernæmontana coronaria .	263	E 2449	Ficus elastica . . .	338
E 2393	Buddleia Colvillei . .	267	E 2450	„ hispida . . .	340
E 2394	Cordia Myxa . . .	271	E 2451	Quercus annulata . .	387
E 2395	Oroxylum indicum .	275, xxvi	E 2452	„ lamellosa . .	388
			E 2453	„ „ . .	388
E 2396	Gmelina arborea . .	296	E 2454	„ pachyphylla . .	386
E 2397	Callicarpa arborea . .	292	E 2455	„ „ . .	386
E 2398	„ „ . .	294	E 2456	„ acuminata . .	386
E 2399	Premna latifolia . . .	294	E 2457	Castanopsis rufescens . .	389
E 2400	„ longifolia . .	294	E 2458	Borassus flabelliformis . .	417
E 2401	Clerodendron Colebrookianum	299	E 2459	Caryota urens . . .	420
E 2402	Caryopteris Wallichiana .	299	E 2460	Wallichia disticha . .	420
E 2403	Betula Bhojpattra .	372, xxix	E 2461	Livistona Jenkinsiana . .	418
			E 2462	Pandanus furcatus . .	425
E 2404	„ acuminata .	373, xxix	E 2463	Pinus excelsa . . .	399
			E 2464	Quercus	383
E 2405	Alnus nepalensis . .	374, xxix	E 2465	Casuarina equisitifolia . .	346
			E 2466	Cocculus laurifolius . .	12
E 2406	Pyrularia edulis . . .	321	E 2467	Bischoffia javanica . .	356
E 2407	Elæagnus latifolia . .	317	E 2468	Trewia nudiflora . . .	360
E 2408	Daphne papyracea . .	315	E 2469	Putranjiva Roxburghii .	353
E 2402	Helicia robusta . . .	318	B 2470	Thespesia populnea . .	43
E 2410	Phlogacanthus thyrsiflorus .	281	B 2472	Maba andamanica . .	253
E 2411	Teucrium macrostachyum .	302	B 2474	Cleistanthus myrianthus .	357
E 2412	Polygonum molle . .	303	B 2475	Macaranga indica . .	363
E 2413	Cinnamomum glanduliferum	306	B 2476	Mallotus muricatus . .	362
E 2414	Machilus odoratissima . .	308	B 2477	Excæcaria Agallocha .	368
E 2415	Phœbe lanceolata . .	308	O 2478	Samara robusta . . .	240
E 2416	„ attenuata . .	308	E 2479	Polyalthia longifolia . .	9
E 2417	Daphnidium pulcherrimum .	312	B 2480	Dipterocarpus tuberculatus .	33
E 2418	„ elongatum .	312	B 2481	Shorea stellata . . .	34
E 2419	Beilschmiedia Roxburghiana	309	B 2482	Cinnamomum . . .	307
E 2420	Litsœa consimilis . . .	311	B 2483	„ . . .	307
E 2421	Mallotus philippinensis .	361	B 2484	Dysoxylum	72
E 2422	„ albus . . .	361	B 2485	Aquilaria Agallocha . .	316
E 2423	„ Roxburghianus .	362	E 2486	Aegle Marmelos . . .	63
E 2424	Macaranga indica . .	363	E 2487	Feronia Elephantum . .	63
E 2425	„ denticulata .	363	E 2488	Thespesia populnea . .	43
E 2426	Macaranga gummiflua . .	363	E 2489	Santalum album . . .	322
E 2427	Jatropha Curcas . . .	365	E 2490	Calophyllum polyanthum .	26

No.	Name.	Page	No	Name	Page
B 2491	Mesua ferrea	27	B 2552	Baccaurea sapida	355
B 2492	Garcinia speciosa	23	B 2553	Artocarpus Lakoocha	330
B 2493	"	23	B 2554	" Chaplasha	331
B 2494	Pterocarpus indicus	130	B 2555	Dipterocarpus turbinatus	32
B 2495	Planchonia littoralis	198	B 2556	Podocarpus bracteata	414
B 2496	Lagerstromia hypoleuca	204	B 2683	Artocarpus Chaplasha	331
B 2497	Mimusops littoralis	246	B 2685	Careya arborea	198
B 2498	Diospyros Kurzii	250	B 2686	Baccaurea sapida	355
B 2499	Artocarpus Chaplasha	331	B 2687	Isonandra obovata	242
B 2500	Garcinia	23	B 2690	Morinda exserta	232
B 2501	Dillenia indica	3	B 2691	Cinnamomum	307
B 2502	" aurea	4	B 2692	Homalium tomentosum	207
B 2504	Mesua ferrea	27	B 2693	Artocarpus Chaplasha	331
B 2505	Dipterocarpus tuberculatus	33	B 2695	Cinnamomum	307
B 2506	" lævis	32	B 2696	Stereospermum xylocarpum	279
B 2507	Shorea stellensis	39	*B 2697*	*Dalbergia cultrata*	128
B 2508	Vatica lanceæfolia	34	B 2698	Hopea odorata	40
B 2509	Hopea odorata	40	B 2699	Homalium tomentosum	207
B 2510	Pterospermum acerifolium	49	B 2700	Mesua ferrea	27
B 2511	" semi sagittatum	50	B 2702	Homalium tomentosum	207
B 2512	Friolæna Candollei	51	B 2703	Careya arborea	198
B 2513	Lophopetalum littorale	85	B 2704	Altingia excelsa	175
B 2514	Carapa moluccensis	74	B 2705	Albizzia	161
B 2515	Schleichera trijuga	96	B 2706	Pterospermum semi-sagittatum	50
B 2516	Chickrassia tabularis	76	B 2708	Pterocarpus indicus	130
B 2517	Odina Wodier	111	B 2709	Tectona grandis	293
B 2518	Melanorrhœa usitata	110	B 2710	Careya arborea	197
B 2519	Mangifera caloneura	107	B 2711	Vitex leucoxylon	298
B 2520	Millettia pendula	118	B 2712	Cassia siamea	138
B 2521	Dalbergia cultrata	128	B 2713	Eugenia grandis	193
B 2522	" nigrescens	129	B 2714	Hopea odorata	40
B 2523	" purpurea	128	B 2715	Quercus lappacea	86
B 2524	Pterocarpus indicus	130	B 2716	Hopea odorata	340
B 2525	Cassia Fistula	136	B 2717	Lagerströmia Reginæ	203
B 2526	" siamea	138	B 2718	Premna tomentosa	294
B 2527	Albizzia procera	159	B 2719	Cinnamomum	307
B 2528	" stipulata	160	B 2720	Baccaurea sapida	355
B 2529	Acacia	153	B 2721	Rhizophora mucronata	176
B 2530	Carallia integerrima	178	B 2722	Berrya Ammonilla	53
B 2531	Terminalia tomentosa	184	B 2728	Dalbergia cultrata	128
B 2532	" belerica	180	P 2729	Olea ferruginea	258
B 2533	Lagerströmia tomentosa	204	C 2731	Bassia latifolia	244
B 2534	Homalium tomentosum	207	C 2732	Dalbergia latifolia	127
B 2535	Anthocephalus Cadamba	220	C 2733	Gardenia latifolia	229
B 2536	Nauclea rotundifolia	223	C 2734	Holarrhena antidysenterica	243
B 2537	Adina sessilifolia	221	C 2735	Lagerströmia parviflora	201
B 2538	" cordifolia	221	C 2736	Zizyphus xylopyra	90
B 2539	Stephegyne parvifolia	222	C 2737	Terminalia belerica	180
B 2540	Gardenia costata	229	C 2738	Phyllanthus Emblica	352
B 2541	Diospyros cordifolia	251	C 2739	Flacourtia Ramontchi	18
B 2542	" ehretioides	250	C 2740	Albizzia procera	159
B 2543	Cordia Myxa	271	C 2741	Pterocarpus Marsupium	133
B 2544	Dolichandrone stipulata	279	C 2742	Chloroxylon Swietenia	77
B 2545	" Rheedii	277	C 2743	Terminalia tomentosa	184
B 2546	Stereospermum chelonoides	278	C 2744	Anogeissus latifolia	186
B 2547	Heterophragma sulfurea	277	C 2745	Stereospermum suaveolens	279
B 2548	Premna tomentosa	294	C 2746	Semecarpus Anacardium	112
B 2549	Vitex leucoxylon	298	C 2747	Careya arborea	198
B 2550	Vitex pubescens	298	C 2748	Albizzia odoratissima	158
B 2551	Tectona grandis	293	C 2749	Lagerströmia parviflora	201

No.	Name.	Page.	No.	Name.	Page.
C 2750	Randia dumetorum	227	H 2825	Indigofera heterantha	117
C 2751	Buchanania latifolia	110	H 2826	Daphne mucronata	315
C 2752	Celastrus senegalensis	87	H 2827	Spiræa canescens	165
C 2753	Zizyphus Œnoplia	90	H 2828	Daphne mucronata	315
C 2754	Diospyros Melanoxylon	240	H 2829	Myrsine africana	239
C 2755	Calicopteris floribunda	185	H 2830	„ semiserrata	239
C 2756	Randia uliginosa	227	H 2831	Marlea begoniæfolia	212
C 2757	Grewia tiliæfolia	55	H 2832	Sarcococca saligna	371
C 2758	Acacia Catechu	154	H 2833	Ficus foveolata	339
C 2759	Butea frondosa	123	H 2834	Viburnum Mullaha	214
C 2760	Terminalia Arjuna	185	H 2835	„ coriaceum	215
C 2761	Eugenia Jambolana	195	H 2836	Deutzia staminea	173
C 2762	Olax scandens	81	H 2837	Euonymus pendulus	85
C 2763	Buchanania latifolia	110	H 2838	Clematis Buchananiana	1
C 2764	Zizyphus xylopyra	90	H 2839	Meriandra strobilifera	301
C 2765	Briedelia retusa	357	H 2840	Plectranthus rugosus	300
C 2766	Grewia tiliæfolia	55	H 2841	Elscholtzia polystachya	301
C 2767	Ougeinia dalbergioides	120	H 2842	Salix elegans	377
C 2768	Lagerströmia parviflora	201	H 2843	Lonicera angustifolia	217
C 2769	Schleichera trijuga	96	H 2844	Euonymus tingens	85
C 2770	Bauhinia racemosa	140	H 2845	Quercus dilatata	384
C 2771	Bassia latifolia	244	H 2846	Skimmia Laureola	61
C 2772	Schrebera swietenioides	256	H 2847	Rosa macrophylla	167
C 2773	Terminalia belerica	180	H 2848	Rhamnus purpureus	92
C 2774	Phyllanthus Emblica	352	H 2849	Leycesteria formosa	217
C 2775	Gmelina arborea	296	H 2850	Deutzia corymbosa	173
C 2776	Anogeissus latifolia	186	H 2851	Clematis montana	1
C 2779	Gardenia turgida	228	H 2852	„ barbellata	1
C 2780	Boswellia thurifera	66	H 2853	Coriaria nepalensis	113
C 2781	Elæodendron Roxburghii	88	H 2854	Salix elegans	377
C 2782	Randia uliginosa	227	E 2855	Toddalia aculeata	61
C 2783	Stephegyne parvifolia	222	E 2856	Pentapyxis stipulata	217, xxiii
C 2784	Ailanthus malabarica	64			
C 2785	Aegle Marmelos	63	E 2857	Artemisia vulgaris	233
C 2786	Eugenia Heyneana	195	E 2858	Actinidia strigosa	28
C 2789	Vitex Negundo	297	E 2859	Hollböllia latifolia	12
C 2792	Bauhinia purpurea	140	E 2860	Leea robusta	93
C 2794	Woodfordia floribunda	200	E 2861	Hypericum Hookerianum	21
C 2796	Ficus glomerata	340	E 2862	Berberis angulosa	14
C 2799	Randia dumetorum	227	E 2863	Lonicera glabrata	216
C 2800	Spondias mangifera	113	E 2864	Berchemia floribunda	90
C 2801	Holarrhena antidysenterica	263	H 2865	Taxus baccata	413
C 2802	Casearia tomentosa	206	H 2866	Viburnum Mullaha	214
C 2803	Ficus hispida	341	H 2867	Quercus incana	385
C 2804	Helicteres Isora	49	H 2168	Prinsepia utilis	165
C 2808	Ficus infectoria	334	H 2869	Viburnum cotinifolium	214
C 2809	Tectona grandis	292	H 2870	Indigofera heterantha	117
C 2810	Stereospermum xylocarpum	279	H 2871	Pinus excelsa	399
C 2811	Tamarindus indica	143	H 2872	Rosa macrophylla	167
C 2813	Ficus bengalensis	334	H 2873	Quercus dilatata	384
C 2814	„ religiosa	335	H 2874	Lonicera quinquelocularis	216
C 2815	Zizyphus Jujuba	89	H 2875	„ angustifolia	217
C 2816	„ „	88	H 2876	Prunus armeniaca	162
C 2817	Bauhinia malabarica	139	H 2877	Rhamnus virgatus	91
C 2818	Salix tetrasperma	376	H 2879	Jasminum officinale	255
H 2819	Deutzia staminea	173	H 2880	Symplocos cratægoides	254
H 2820	Clematis grata	1	H 2881	Euonymus tingens	85
H 2821	Randia tetrasperma	227	H 2882	Buddleia paniculata	267
H 2822	Leptodermis lanceolata	232	H 2883	Euonymus lacerus	84
H 2823	Cotoneaster microphylla	171	H 2884	Populus ciliata	379
H 2824	Indigofera atropurpurea	117	H 2885	Coriaria nepalensis	113

No	Name	Page	No	Name	Page.
H 2886	Viburnum fœtens	215	H 2946	Sageretia theezans	92
H 2887	Pyrus lanata	169	H 2947	Zizyphus oxyphylla	89
H 2888	Berberis aristata	13	H 2948	Litsæa lanuginosa	312
H 2889	Cotoneaster acuminata	171	H 2949	Xylosma longifolium	18
H 2890	„ bacillaris	171	H 2950	Celastrus spinosus	xiii
H 2891	Jasminum revolutum	255	H 2951	Sageretia theezans	92
H 2892	Meliosma dilleniæfolia	103	H 2952	Rhamnus procumbens	92
H 2893	Quercus semecarpifolia	382	E 2953	Calophyllum polyanthum	26
H 2894	Berberis coriacea	14	E 2954	Bauhinia Vahlii	139
H 2895	Abies Webbiana	408	E 2955	Eugenia Kurzii	194
H 2896	„ Smithiana	407	E 2956	„ formosa	193
		xxx	E 2957	Rhododendron fulgens	238
H 2897	Euonymus Hamiltonianus	84	E 2958	„ cinnabarinum	238
H 2898	Deutzia corymbosa	173	W 2959	Tectona grandis	293
H 2899	Acer villosum	100	2961	Nectandra Rodiæi	313
H 2900	Staphylea Emodi	102	2962	Sassafras officinale	313
H 2901	Acer cæsium	100	2963	Cæsalpinia crista	135
H 2903	Rhamnus triquetrus	92	2964	„ echinata	135
H 2904	Betula acuminata	373	2965	Maclura tinctoria	328
		xxix	2966	Hæmatoxylon Campechianum	135
H 2905	Salix daphnoides	377	H 2967	Cratægus crenulata	170
H 2906	„ elegans	377	H 2968	Quercus lanuginosa	384
H 2907	Rhus succedanea	106	H 2969	Bassia latifolia	244
H 2908	Ribes glaciale	[illegible]	H [illegible]	[illegible]	170
H 2909	Lonicera orientalis				257
H 2910	Salix Wallichiana				39
H 2911	Syringa Emodi				39
H 2912	Lonicera alpigena				257
H 2913	Vitis himalayana	93	2975	Ulmus montana	341
H 2914	Buxus sempervirens	371			xxviii
B 2915	Pentace burmanica	vii	2978	Quercus Ilex	383
E 2916	Heritiera littoralis	48	C 2979	Strychnos potatorum	269
D 2917	Pterocarpus Marsupium	132	O 2980	Shorea robusta	38
C 2918	„ „	133	O 2981	Diospyros Melanoxylon	249
P 2919	Balsamodendron Mukul	67	C 2982	Tectona grandis	292
C 2920	Ventilago maderaspatana	91	C 2983	„ „	292
C 2921	Vallaris dichotoma	261	C 2984	Dalbergia latifolia	127
W 2922	Borassus flabelliformis	417	C 2985	Cordia Macleodii	271
D 2923	Diospyros quæsita	250	C 2986	Hardwickia binata	143
C 2924	Terminalia tomentosa	184	C 2987	Tectona grandis	292
2925	Aporosa dioica	355	C 2988	Adina cordifolia	221
D 2926	Chloroxylon Swietenia	xii	C 2989	Albizzia stipulata	160
O 2927	Spatholobus Roxburghii	122	C 2990	Shorea robusta	38
C 2928	Dalbergia paniculata	129	O 2991	Elæodendron Roxburghii	88
C 2929	Hardwickia binata	143	O 2992	Odina Wodier	111
H 2930	Pistacia integerrima	107	O 2993	Eugenia Jambolana	195
P 2931	Zizyphus nummularia	89	O 2994	Adina cordifolia	221
P 2932	Celastrus spinosus	87	O 2995	Terminalia belerica	180
C 2933	Tectona grandis	292	O 2996	„ tomentosa	184
H 2934	Desmodium tiliæfolium	120	O 2997	Anogeissus latifolia	186
H 2935	Indigofera heterantha	117	O 2998	Cordia vestita	271
H 2936	Elsholtzia polystachya	301	O 2999	Lagerstrœmia parviflora	211
H 2937	Abelia triflora	216	O 3000	Bœhmeria regulosa	325
H 2938	Loranthus vestitus	320	O 3001	Bridelia retusa	358
H 2939	Cocculus laurifolius	12	O 3002	Ulmus integrifolia	342
H 2940	Olea glandulifera	258	O 3003	Pinus longifolia	395
H 2941	Securinega obovata	354	O 3004	Albizzia procera	170
H 2942	Rhus semialata	105	E 3005	Terminalia Catappa	182
H 2943	Adhatoda Vasica	281	H 3006	Acer villosum	100
H 2944	Acer oblongum	99	H 3007	Acer caudatum	10[illegible]
H 2945	Andrachne cordifolia	319	H 3008	„ pictum	101

No.	Name.	Page.	No.	Name.	Page.
E 3296	Vaccinium serratum . .	234	E 3361	Rubus paniculatus . .	xix
E 3297	Capparis olacifolia . .	ii	E 3362	Phyllanthus reticulatus .	53
E 3298	Croton caudatus . . .	359	E 3363	Randia rigida . . .	xxiii
E 3299	Tournefortia viridiflora .	269	E 3364	Rhamnus nepalensis . .	xiv
E 3300	Goniothalamus sesquipedalis	ii	E 3365	Garcinia	iv
E 3301	Combretum decandrum .	179	E 3366	Licuala peltata . . .	418
E 3302	Samara undulata . .	210	E 3367	Ardisia paniculata . .	xxiv
E 3303	Homonoya riparia . .	364	E 3368	Unona longiflora . . .	ii
E 3307	Rubus lineatus . . .	166	E 3369	Shorea assamica . . .	vi
E 3308	Euonymus theæfolius .	85	E 3370	Delima sarmentosa . .	i
E 3309	Prunus acuminata . .	164	E 3371	Citrus Aurantium . .	x
E 3310	Osbeckia crinita . . .	199	E 3372	Styrax	xxv
E 3311	Priotropis cytisoides . .	xvi	E 3373	Sapindus Danura . .	xv
E 3312	Vernonia volkameriæfolia .	233	E 3374	Tetranthera tomentosa .	311
E 3314	Leptoboea multiflora . .	274	E 3375	Zanthoxylum oxyphyllum .	ix
E 3315	Ardisia crispa . . .	211	E 3376	Teucrium macrostachyum .	302
E 3316	Sarcosperma arborea . .	242	E 3377	Calamus schizospathus .	420
E 3317	Böhmeria platyphylla .	{ 325 xxvii	B 3378	Cedrela multijuga . .	xiii
			B 3379	Sonneratia acida . . .	xvi
E 3318	Grewia polygama . .	vii	B 3380	Mitrephora vandæflora .	ii
E 3319	Securinega Leucopyrus .	354	E 3383	Rubus lineatus . . .	xix
E 3320	Styrax virgatum . . .	253	E 3384	Quercus acuminata . .	xxix
E 3321	Michelia Cathcartii . .	i	E 3385	Shorea robusta . . .	vi
E 3322	Myrsine semiserrata . .	239	E 3386	Tectona grandis . . .	293
E 3323	Wightia gigantea . .	273	E 3387	" " . . .	294
E 3324	Zanthoxylon Budrunga .	ix	E 3388	" " . . .	294
E 3325	Pieris ovalifolia . .	{ 235 xxiv	E 3390	Shorea robusta . . .	vi
			E 3391	Celastrus acuminatus . .	xiii
E 3326	Heptapleurum elatum .	208	E 3392	Amoora decandra . .	xi
E 3327	Aucuba himalaica . .	213	E 3393	Polygala arillata . . .	iii
E 3328	Debregeasia longifolia .	326	E 3394	Gaultheria Griffithiana .	xxix
E 3329	" leucophylla .	326	E 3395	Premna interrupta . .	294
E 3330	Erythrina arborescens .	xvi	E 3396	Morus cuspidata . .	{ 329 xxvii
E 3331	Michelia lanuginosa . .	i			
E 3333	Quercus acuminata . .	386	E 3397	Mallotus oreophilus . .	362
E 3334	Ficus Fieldingii . . .	xxviii	E 3400	Photinia integrifolia . .	xx
E 3335	Eriobotrya elliptica . .	xix	E 3401	Bixa Orellana . . .	iii
E 3336	Symplocos ramosissima .	254	E 3402	Gamblea ciliata . . .	xxii
E 3337	Quercus Griffithii . .	382	E 3403	Pyrus rhamnoides . .	xix
E 3338	" fenestrata . .	383	E 3404	" foliolosa . . .	xix
E 3339	" serrata . . .	384	E 3405	Piptanthus nepalensis . .	xvi
E 3340	Excæcaria baccata . .	367	E 3406	Euonymus rigidus . .	xiii
E 3341	Melia	xiii	E 3407	Ilex insignis . . .	xiii
E 3342	Helwingia himalaica . .	209	E 3409	Brassaiopsis speciosa . .	xxvi
E 3343	Ulmus lancifolia . .	342	E 3410	[illegible] . . .	xix
E 3344	Solanum verbascifolium .	273	E 3411	[illegible] . . .	xxv
E 3345	Microtropis discolor . .	xiv	E 3414	[illegible] . . .	414
E 3346	Rhamnus nepalensis . .	xiv	E 3415	Zanthoxylum [illegible] .	xii
E 3347	Symplocos glomerata . .	xxv	E 3416	" Hamiltonianum .	ix
E 3348	Citrus medica . . .	x	E 3419	Oxyspora paniculata . .	xxi
E 3349	Capparis multiflora . .	ii	[illegible]	[illegible] . . .	xix
E 3350	Ardisia [illegible] . .	xxiv	E 3422	[illegible] . . .	xx
E 3352	Garcinia [illegible] . .	iv	E 3423	[illegible] . . .	171
E 3353	Zanthoxylum [illegible] .	ix	E 3424	" " . . .	[illegible]
E 3354	[illegible] . . .	x	E 3425	[illegible] . . .	[illegible]
E 3355	[illegible] . . .	x	E 3426	[illegible] . . .	[illegible]
E 3356	[illegible] . . .	[illegible]	E 3427	[illegible] . . .	[illegible]
E 3357	[illegible] . . .	[illegible]	E 3428	[illegible] . . .	[illegible]
E 3358	[illegible] . . .	x	E 3429	[illegible] . . .	[illegible]
E 3359	[illegible] . . .	xv	E 3430	[illegible] . . .	[illegible]
E 3360	[illegible] . . .	xi	E 3431	[illegible] . . .	[illegible]

No	Name	Page	No	Name	Page
C 3432	Desmodium pulchellum	xvi	C 3496	Thevetia neriifolia .	xxvi
C 3433	Zizyphus xylopyra .	xiv	C 3497	Erycibe paniculata . .	xxvi
C 3434	Shorea robusta	vi	C 3498	Briedelia tomentosa .	xxviii
C 3435	Gardenia turgida .	xxiii	C 3499	Cipadessa fruticosa . .	xi
C 3436	Sterculia urens . .	vii	C 3500	Strychnos potatorum . .	xxvi
C 3437	Friolæna Hookeriana .	vii	C 3501	Phyllanthus lanceolarius .	xxviii
C 3438	Embelia robusta	xxiv	C 3502	Maba buxifolia . .	xxv
C 3439	Eugenia Heyneana	xx	C 3503	Briedelia stipularis	xxix
C 3440	Shorea robusta	vi	C 3504	Sideroxylon tomentosum	xxiv
C 3441	" " .	vi	C 3506	Acacia leucophlœa .	xviii
C 3442	Heptapleurum venulosum	xxii	C 3507	Pisonia aculeata	xxvii
C 3443	Chloroxylon Swietenia	xii	C 3508	Zizyphus xylopyra .	xiv
C 3444	Shorea robusta .	vi	C 3509	Euphorbia Tirucalli . .	xxix
C 3445	Callicarpa arborea .	xxvii	C 3511	Carissa Carandas . .	xxv
C 3446	Calotropis gigantea . .	xxvi	C 3512	Calotropis gigantea .	xxvi
C 3447	Indigofera pulchella .	xvi	C 3513	Ochrocarpus longifolius .	iv
C 3448	Celastrus paniculata	xiii	C 3514	Xylia dolabriformis .	xviii
C 3449	Ailanthus excelsa	x	C 3515	Atalantia monophylla . .	x
C 3450	Dalbergia volubilis .	xvii	C 3516	Shorea robusta	vi
C 3451	Breynia rhamnoides	xxviii	C 3517	Gyrocarpus Jacquinii . .	xx
C 3452	Lebedieropsis orbicularis	xxix	C 3518	Carissa diffusa	xxv
C 3453	Flacourtia Ramontchi .	iii	C 3519	Flacourtia sepiaria	iii
C 3454	Schrebera swietenioides	xxv	C 3520	Webera asiatica .	xxiii
C 3455	Cordia Macleodii	xxvi	[illegible]	[illegible]	xiv
C 3456	Dalbergia latifolia .	xvii	[illegible]	[illegible]	xiii
C 3457	Grewia salvifolia	vii	[illegible]	[illegible]	vii
C 3458	Croton oblongifolius	xxix	[illegible]	[illegible]	iv
C 3459	Heynea trijuga .	xi	[illegible]	[illegible]	xviii
C 3460	Cæsalpinia sepiaria .	xvii	C 3527	Casearia tomentosa . .	xxi
C 3461	Terminalia Arjuna .	xx	C 3528	Embelia robusta . .	xxiv
C 3462	Anogeissus acuminata . .	xx	C 3529	Ochna Wodier .	xv
C 3463	Ardisia solanacea	xxiv	C 3530	Limonia acidissima .	x
C 3464	Ixora parviflora	xxiii	C 3531	Terminalia Chebula . .	xx
C 3465	Gardenia gummifera .	xxiii	C 3532	Buchanania latifolia	xv
C 3466	Alangium Lamarckii .	xxii	C 3533	Schleichera trijuga . .	xiv
C 3467	Olax scandens . . .	xiii	C 3534	Pterospermum suberifolium .	vii
C 3468	Acacia Intsia . . .	xix	C 3535	Morinda tinctoria . .	xxiv
C 3470	Barringtonia acutangula	xxi	C 3536	Saccopetalum tomentosum .	ii
C 3471	Saccopetalum tomentosum	ii	C 3537	Strychnos Nux vomica .	xxvi
C 3472	Shorea robusta . . .	vi	C 3538	" " . .	xxvi
C 3473	" " . . .	vi	C 3539	Phyllanthus Emblica . .	xxviii
C 3474	Diospyros Embryopteris .	xxv	C 3541	Ochna squarrosa . .	x
C 3475	Rhabdia viminea . .	xxvi	C 3542	Pterocarpus Marsupium .	xvii
C 3476	Cedrela Toona . . .	xii	C 3543	Adina cordifolia . . .	xxiii
C 3477	Ougeinia dalbergioides . .	xvi	C 3544	Cassia Fistula . . .	xviii
C 3478	Shorea robusta . . .	[illegible]	[illegible]	[illegible]	xii
C 3479	" " . . .	[illegible]	[illegible]	[illegible]	xviii
C 3480	" " . . .	[illegible]	[illegible]	[illegible]	xxi
C 3481	Plectronia didyma .	[illegible]	[illegible]	[illegible]	xxix
C 3482	Carallia integerrima .	[illegible]	[illegible]	[illegible]	xxvi
C 3483	Polyalthia suberosa .	[illegible]	[illegible]	[illegible]	xxvii
C 3484	Ventilago calyculata . .	[illegible]	[illegible]	[illegible]	xxiv
C 3485	Phyllanthus lanceolarius .	[illegible]	[illegible]	[illegible]	[illegible]
C 3486	Linociera dichotoma . .	[illegible]	[illegible]	[illegible]	[illegible]
C 3488	Flacourtia Ramontchi . .	[illegible]	[illegible]	[illegible]	[illegible]
C 3490	Shorea robusta .	[illegible]	[illegible]	[illegible]	[illegible]
C 3491	Symplocos racemosa . .	xxv	[illegible]	[illegible]	xix
C 3492	Nyctanthes Arbor tristis .	xxv	C 3561	Memecylon umbellatum .	xxi
C 3493	Diospyros Melanoxylon .	xxiv	C 3562	Anogeissus latifolia . .	xx
C 3494	Olax scandens . .	xiii	C 3564	Alangium Lamarckii . .	xxii
C 3495	Murraya exotica . . .	x	C 3565	Hymenodictyon excelsum .	xxiii

No.	Name.	Page.	No.	Name.	Page.
C 3566	Soymida febrifuga . .	xii	E 3605	Gmelina arborea . . .	xxvii
C 3567	Albizzia Lebbek . .	xix	E 3606	Bombax malabaricum . .	vii
C 3569	Carissa Carandas . . .	xxv	E 3607	Quercus pachyphylla . .	xxx
C 3570	Limonia acidissima . .	x	E 3608	Daphniphyllopsis capitata .	xiii
C 3571	Dillenia pentagyna . .	i	E 3609	Quercus annulata . .	xxx
C 3572	Chloroxylon Swietenia . .	xii	E 3610	Echinocarpus dasycarpus .	xxx
E 3576	Pentapanax racemosum .	xxii	E 3611	Lagerströmia parviflora .	xxx
C 3577	Streblus asper . . .	xxvii	E 3612	Ficus clavata . . .	xxviii
C 3578	Premna latifolia . . .	xxvii	E 3615	Cryptomeria japonica . .	xxx
C 3579	Webera asiatica . . .	xxiii	E 3616	Shorea robusta . . .	vi
C 3580	Capparis sepiaria . .	iii	E 3617	,, ,, . . .	vi
C 3581	Actinodaphne angustifolia .	xxvii	E 3618	,, ,, . . .	vi
C 3582	Eugenia zeylanica . .	xx	E 3619	Cedrela microcarpa . .	xii
E 3586	Michelia excelsa . . .	i	E 3620	Gmelina arborea . .	xxvii
E 3587	Juglans regia . . .	xxx	E 3622	Duabanga sonneratioides .	xxi
E 3588	Dalbergia Sissoo . . .	xvii	E 3623	Cedrela microcarpa . .	xii
E 3589	Shorea robusta . . .	vi	E 3624	Shorea robusta . . .	vi
E 3590	Terminalia tomentosa . .	xx	E 3625	,, ,, . . .	vi
E 3592	Canarium bengalense . .	xi	E 3626	,, ,, . . .	vi
E 3593	Beilschmiedia Roxburghiana	xxvii	E 3627	,, ,, . . .	vi
E 3595	Dysoxylum procerum . .	xi	E 3628	,, ,, . . .	vi
E 3596	Pterospermum acerifolium .	vii	E 3629	,, ,, . . .	vi
E 3597	Ehretia Wallichiana . .	xxx	E 3630	,, ,, . . .	vi
E 3598	Eugenia Jambolana . .	xx	E 3631	Michelia excelsa . . .	i
E 3599	Cedrela microcarpa . .	xii	E 3632	Juglans regia . . .	xxx
E 3600	Terminalia belerica . .	xxx	E 3633	Pyrus rhamnoides . .	xx
E 3602	Schima Wallichii . .	v	E 3634	Machilus odoratissima . .	xxvii
E 3603	Stereospermum chelonoides .	xxx	E 3635	Heptapleurum impressum .	xxii
E 3604	Garuga pinnata . . .	xi	E 3636	Tephrosia candida . .	xvi

Pages.

AILANTHUS . . 63, 64
excelsa, DC. . 64, x
glandulosa, Desf. . 64
malabarica, DC. . 64, x
Ajugoideæ . . . 300
ALANGIUM . . 210, 211
decapetalum, Lam. . 211
hexapetalum, Roxb. . 211
Lamarckii, Thw. . 211, xxii
Sundanum, Miq. . . 211
ALBIZZIA . . 145, 156
amara, Boivin . 160, xix
elegans, Kurz . . 156
Julibrissin, Boivin . 169
Lebbek, Benth. . 156, xix
lophantha, Bth. . . 156
lucida, Benth. . . 159
myriophylla, Bl. . . 156
odoratissima, Benth. . 158
procera, Benth. . 158, xix
stipulata, Boivin . 160, xix
Wightii, Grah. . . 160
Alchornea . . . 347
mollis, Müll. Arg. . 348
rugosa, Müll. Arg. . 448
tiliæfolia, Müll. Arg. . 348
Aleurites . . . 347
cordata, Müll. Arg. . 348
moluccana, Willd. . 347
triloba, Forst. . . 347
Alhagi 116
Maurorum, Desv. . 119
Allamanda . . . 260
cathartica, Linn. . 260
Allomorphia . . . 198
ALLOPHYLLUS . 93, 94
Cobbe, Bl. . . . 94
Zeylanicus, Linn. . 94
ALNUS . . . 372, 373
dioica, Roxb. . . 355
glutinosa, Linn. . . 373
incana, Willd. . . 373
nepalensis, D. Don. . 373
nitida, Endl. . . 373
Alphonsea . . . 7
lutea, Hook. f. and Th. 8
madraspatana, Bodd. . 8
ventricosa, Hook. f. and Th. . . . 8
zeylanica, Hook. f. and Th. 8
ALSEODAPHNE . 304, 307
grandis, Nees . . 307
semecarpifolia, Nees . 307
Alsodeia 16
bengalensis, Wall. . 16
longiracemosa, Kurz . 16
racemosa, Hk. f. & Th. 16
Roxburghii, Wall. . 16
Alsophila 431
Andersoni, J. Scott . 432
Brunoniana, Wall. . 431
contaminans, Wall. . 432
crinita, Hook. . . 432
glabra, Hook. . . 432
glauca, J. Sm. . . 432
gigantea, Hook. . . 432
latebrosa, Hook. . . 431
Oldhami, Bedd. . . 432
ornata, J. Scott . . 432
Schmidiana, Kze. . 431
Scottiana, Baker . . 432

ALSTONIA . . 260, 262
scholaris, R. Br. . 262, xxvi
spectabilis, R. Br. . 262
venenata, R. Br. . . 262
ALTINGIA . . . 175
excelsa, Noronha . . 175
Alyxia . . . 260, 261
AMARANTACEÆ . . 302
Amherstia . . . 134
nobilis, Wall. . . 135
Amherstieæ . . . 134
AMOORA . . . 68, 72
canarana, Bth. & Hk. f. 72
Chittagonga, Hiern . 72
cucullata, Roxb. . . 73
decandra, Hiern . 72, xi
Lawii, Bth. and Hook. f. 72
Rohituka, W. and A. 73, xi
spectabilis, Miq. . . 73
AMPELIDEÆ . . 93
Amphicome arguta, Royle, 274
Amygdalus communis, Wall. 162
persica, Willd. . . 162
ANACARDIACEÆ . . 103
Anacardieæ . . . 103
ANACARDIUM . . 103, 108
latifolium . . . 111
occidentale, Linn. . 108
Anacolosa . . . 80
densiflora, Beddome . 80
Griffithii, Mast. . . 80
ilicoides, Mast. . . 80
puberula, Kurz . . 80
Anamirta 11
Cocculus, W. and A. . 11
Anaxagorea . . . 7
Ancistrocladus . . 31
Griffithii, Planch. . 31
Wallichii, Planch. . 31
Andersonia cucullata, Roxb. . . 73
Rohituka, Roxb. . . 73
ANDRACHNE . . 347, 349
cordifolia, Müll. Arg. 349
telephioides, Linn. . 349
trifoliata, Roxb. . . 355
Andromedeæ . . . 234
Andromeda formosa, Wall. 235
ovalifolia, Wall. . . 235
Androscepia . . . 426
Anerincleistus . . . 198
Angiopteris evecta, Hoff. 432
Anisophyllea . . 175, 178
zeylanica, Bth. . . 178
Anisoptera . . . 31
glabra, Kurz . . 31
odorata, Kurz . . 33
Anneslea . . . 27, 28
fragrans, Wall. . . 28
monticola, Kurz . . 28
Anodendron . . 260, 261
ANOGEISSUS . . 178, 185
acuminata, Wall. . 186, xx
latifolia, Wall. . 185, xx
pendula, Edgw. . . 187
phillyreæfolia, H. and M. Arg. . . . 185
ANONA 7, 9
muricata, L. . . 9
reticulata, Linn. . . 9
squamosa, Linn. . . 9

ANONACEÆ . . . 9
Anplectrum . . . 197
Anthemideæ . . . 232
Anthistiria . . . 426
ANTHOCEPHALUS . 217, 219
Cadamba, Bth. . 219, xxiii
ANTIARIS . . 323, 332
innoxia, Bl. . . . 332
saccidora, Dalz. . . 332
toxicaria, Lesch. . . 332
ANTIDESMA . . 347, 349
Bunias, Spr. . . 350
diandrum, Tul. . . 350
fruticulosum, Kurz . 349
Ghæsembilla, Gaertn. . . 349, xxviii
lanceolatum, Tul. . 349
martabanicum, Presl. . 349
Menasu, Müll. Arg. . 350
molle, Müll. Arg. . 349
nigricans, Tul. . . 349
oblongatum, Müll. Arg. 349
paniculatum, Roxb. . 349
pubescens, Willd. . . 349
refractum, Müll. Arg. . 349
simile, Müll. Arg. . 349
velutinosum, Bl. . . 349
velutinum, Tul. . . 349
Antitaxis 11
Aperula 304
assamica, Meissn. . 304
Neesiana, Bl. . 304, 307
APOCYNEÆ . . . 260
Apodytes 80
andamanica, Kurz . 80
Benthamiana, Wight . 80
Apollonias . . . 304
Arnottii, Nees . . 304
APOROSA . . 347, 354
dioica, Müll. Arg. . 354
lanceolata, Thw. . . 355
Lindleyana, Wight . 355
macrophylla, Müll. Arg. 355
microstachya, Müll. Arg. 355
oblonga, Müll. Arg. . 355
Roxburghii, Baill. . 355
villosa, Baill. . . 355
villosula, Kurz . . 355
Apteron 88
Aquilarineæ . . . 314
AQUILARIA . . . 316
Agallocha, Roxb. . 316
malaccensis, Lamk. . 316
ARALIACEÆ . . . 208
Aralieæ 208
Aralia 208
armata, Seem. . . 208
cachemirica, Dcne. . 208
digitata, Roxb. . . 209
foliolosa, Seem. . . 208
papyrifera, Hook. . 209
Araucarieæ . . . 394
Araucaria . . . 394
Bidwilli, Hook. . . 394
Cookii, R. Br. . . 394
Cunninghamii, Ait. . 394
excelsa, R. Br. . . 394
imbricata, Pavon . . 394
Arceuthobium . . . 319
Oxycedri, M. Bieb. . 319

Pages.

ARDISIA . . . 238, 240
elliptica, Thunb. . . 240
crispa, DC . . 240
floribunda, Wall. . . 240
humilis, Vahl . . 240
involucrata, Kurz . xxiv
paniculata, Roxb 240
pauciflora, Heyne . 240
rhomboidea, Wight 240
solanacea, Roxb. . { 240, xxiv
Arecineæ . . 415
ARECA . 415, 421
Catechu Linn . 421
costata, Bl . 421
Dicksoni, Roxb. 421
disticha, Roxb . 421
gracilis, Roxb . 421
hexasticha, Kurz 421
laxa, Buch . . 421
nagensis, Griff. . [illegible]
triandra, Roxb
ARENGA
saccharifera Labill
Wightii, Griff
Argania Sideroxy
R S .
Argyreia .
speciosa, Sweet
Artabotrys
odoratissimus, R B
ARTEMISIA
vulgaris, Linn
Arthrophyllum
diversifolium, Bl
javanicum, Bl.
Artocarpeæ
ARTOCARPUS
calophylla, Kurz
Chaplasha, Roxb
echinata, Roxb
Gomeziana, Wall
hirsuta Lamk
incisa, Linn
integrifolia, Linn
Lakoocha, Roxb.
[illegible]
As[illegible]
Asplenium polypodioides, Mett . 432

Pages

Asteroideæ . . 232
Astronieæ . . 198
Asystasia . . 280, 281
ATALANTIA . . 59, 62
caudata, Hook f. . 62
macrophylla Kurz . 62
missionis, Oliv . 62
monophylla, Correa 62, x
racemosa, W. and A. 62
Atraphaxis . . 303
spinosa, Linn . . 303
Attacus Atlas . . i
AUCUBA 210, 213
himalaica, Hook f & Th . . . 213
japonica, Thunb. . 213
Aurantieæ . . . 59
Averrhoa . . 58
Bilimbi, Linn . 58
Carambola, Linn. 58
Av[illegible] 281
[illegible] 427
[illegible] 428
[illegible] 429
[illegible] 428
[illegible] 428
[illegible] 427
[illegible] . 318
Baphia nitida . . 115
Barleria . . 280, 281

Pages.

BARRINGTONIA . 167, 196
acutangula, Gaertn { 196, xxi
augusta, Kurz . 196
conoidea, Griff . 196
Helferi, C B Clarke . 196
macrostachya, Kurz . 196
pendula, Kurz . 196
pterocarpa, Kurz . 196
racemosa, Blume. . 196
speciosa, Forst . 71, 196
BASSIA . 241, 243
butyracea, Roxb . 244
elliptica, Dalz . 242
latifolia, Willd 243, xxiv
longifolia . 244
polyantha, Wall 242
Batis spinosa, Roxb . 327
BAUHINIA 134, 138
acuminata, Linn . 138
[illegible]
Roxburghiana, Nees { [illegible], xxx
Bennettia . . 347
Wallichii, R. Br. . 348
Benthamia fragifera, Ldl. 212
Bentinckia . 415, 421
Coddapanna, Berry . 421
[illegible]
pinnata, Roxb. . 13
vulgaris, Linn. 12, 13
Wallichiana, DC. . 12

Pages.

BERCHEMIA . . . 90
lineata, DC. . 88, 90
floribunda, Brongn. 90, 91
Bergera Königii, Linn. 62, ix
BERRYA . . . 51, 52
Ammonilla, Roxb. 52, vii
BETULACEÆ . . 372
BETULA 372
acuminata, Wall. 372, 373
alba, Linn. . . . 372
Bhojpattra, Wall. . 372
cylindrostachys, Wall. 373
Jacquemontii, Spach . 372
papyracea, Willd. . 372
BIGNONIACEÆ . . 274
Bignonia chelonoides, Linn.. . . . 278
crispa, Buch. . . 276
indica, Roxb. . . 275
quadrilocularis, Roxb. 277
spathacea, Roxb. . 276
stipulata, Roxb. . . 276
suaveolens, Roxb. . 278
suberosa, Roxb. . . 274
undulata, Roxb. . . 275
xylocarpa, Roxb. . 279
BIGNONIEÆ . . . 274
Biota 394
orientalis, Endl. . 394, 414
BISCHOFFIA . . 347, 355
javanica, Bl. . . 355
Bixa 16
Orellana, Linn. . 16, iii
Bixeæ 16
BIXINEÆ 16
Blackwellia tomentosa, Vent. . . . 207
Blastus 198
Blepharistemma corymbosum, Wall. . . 175
Blumea 232
balsamifera, DC. . 232
Blumeodendron Tokbrai, Kurz . . . 360
Bocagea 7
BÖHMERIA . . 323, 324
Hamiltoniana, Wedd. 324
macrophylla, Don . 324
malabarica, Wedd. . 324
nivea, Hook. and Arn. 324
platyphylla, Don . 325
rugulosa, Wedd. . . 324
travancorica, Beddome 324
Böhmerieæ . . . 323
Bombaceæ . . . 42
BOMBAX . . . 42, 44
Gossypium, Roxb. . 17
insigne, Wall. . . 44
malabaricum, DC. 38, 44, vi
pentandrum, Roxb. . 42
pentaphyllum, Cuv. . 44
Bombyx Crœsi . . 328
,, textor . . 328
Bönninghausenia . . 59
BORAGINEÆ . . 269
Borassineæ . . . 415
BORASSUS . . 415, 416
flabelliformis, Linn. . 416
BOSWELLIA . . . 66
glabra, Roxb. . . 66
serrata, Roxb. . . 66
thurifera, Colebr. . 66

BOUEA . . 103, 104, 108
burmanica, Griff. . 108
oppositifolia, Meissn. . 108
Bougainvillea . . . 302
Bradleia lanceolaria, Rox. 351
Brainea . . . 431, 432
insignis, Hook. . 432, xxx
Brandisia 273
discolor, Hook. f. & Th. 273
Brassaia 208
capitata, C. B. Clarke . 208
BRASSAIOPSIS . . 208, 209
floribunda, Seem. . xxii
Hainla, Seem. . . 209
mitis, C. B. Clarke . 210
palmata, Kurz . . 209
speciosa, Dcne & Plch. xxii
Breynia 347
rhamnoides, Müll. Arg. . . . 347, xxviii
BRIEDELIA . . 347, 356
crenulata, Roxb. . . 356
dasycalyx, Kurz . 356
hamiltoniana, Müll. Arg. 356
lanceæfolia, Roxb. . 357
montana, Willd. . . 357
ovata, Dcne. . . 356
retusa, Sprengel 356, xxviii
scandens, Roxb. . . 356
spinosa, Willd. . . 356
stipularis, Bl. . 356, xxix
tomentosa, Bl. 357, xxviii
Broussonetia . . 323, 324
papyrifera, Vent. . 323
Broussonetieæ . . . 323
Brownlowia . . . 51, 52
elata, Roxb. . . . 52
lanceolata, Bth. . . 52
peltata, Bth. . . . 52
Brownlowieæ . . . 51
Brucea 63
mollis, Wall. . . 63
sumatrana, Roxb. . . 63
BRUGUIERA . . 175, 177
caryophylloides, W. & A. 177
eriopetala, W. and A. . 176
gymnorhiza, Lam. . 177
malabarica, Arn. . 177
parviflora, W. and A. . 177
Rheedii, Bl. . . 177
BUCHANANIA . . 103, 110
angustifolia, Roxb. . 109
latifolia, Roxb. . 109, xv
BUCKLANDIA . . . 174
populnea, R. Br. . 174
BUDDLEIA . . . 266
asiatica, Lour. . . 266
Colvillei, Hook. f. & Th. 267
crispa, Bth. . . . 267
macrostachya, Bth. . 266
Neemda, Roxb. . . 266
paniculata, Wall. . 267
Buettneria . . . 45
Buettnerieæ . . . 45
BURSERACEÆ . . . 66
BURSERA . . . 66, 67
serrata, Colebr. . . 67
Bursereæ 66
BUTEA . . . 116, 123
frondosa, Roxb. . 123, xvii
minor, Ham. . . 123
parviflora, Roxb. . 122
superba, Roxb. . . 123

Buxaceæ 347
Buxeæ 347
BUXUS . . . 347, 369
sempervirens, Linn. . 369
Wallichiana, Baillon . 369
Byrsophyllum . . 218
tetandrum, Bedd. . 218

C.

Cactus indicus, Roxb. . 208
CACTEÆ . . . 208
Cadaba 14
heterotricha, Stocks . 14
indica, Lamk. . . 14
Cæsalpinieæ . . . 134
CÆSALPINIA . . 134, 135
Bonducella, Roxb. . 135
braziliensis . . . 135
coriaria, Willd. . . 135
crista 135
cucullata, Roxb. . . 135
echinata . . . 135
lacerans, Roxb. . . 134
pulcherrima, Sw. . 135
Sappan, Linn. . . 135
sepiaria, Roxb. . 135, xvii
Cajanus 116
indicus, Spreng. . . 123
CALAMUS . . 415, 423
acanthospathus, Griff. 423
andamanicus, Kurz . 424
arborescens, Griff. . 423
collinus, Griff. . . 423
concinnus . . . 424
erectus, Roxb. . . 423
extensus, Roxb. . . 424
fasciculatus, Roxb. . 423
flagellum, Griff. . . 423
floribundus, Griff. . 423
gracilis, Roxb. . . 423
grandis, Griff. . . 424
Guruba, Mait. . . 424
Helferianus, Kurz . 424
humilis, Roxb. . . 423
hypoleucus, Kurz . 424
inermis, T. And. . . 424
Jenkinsianus, Griff. 425, xxx
latifolius, Roxb. . 423, 424
leptospadix, Griff. . 423
longipes, Griff. . . 429
macracanthus, T. And. 424
macorcarpus, Griff. . 423
Mastersianus, Griff. 424, xxx
melanacanthus . . 424
mishmiensis, Griff. . 423
montanus, T. And. . 424
nitidus 424
nutantiflorus, Griff. . 424
palustris, Griff. . . 423
paradoxus, Kurz . . 424
platyspathus . . . 424
polygamus, Roxb. . 423
quinquenervius, Roxb. 424
Rotang, Roxb. . . 423
Roxburghii, Griff . . 423
Royleanus, Griff. . 423
schizospathus, Griff. . 423
tenuis, Roxb. . 423, xxx
tigrinus, Kurz . . 424

Pages
Calamosagus laciniosus Griff 494
scaptiger Griff 494
CALICOPTERIS 178 185
floribunda 185
nutans Kurz 185
Calliandra 145
cynometroides Bedd 145
Griffithii Bth 145
umbrosa Bth 145
CALLICARPA 281 282
arborea, Roxb 282 xxvii
cana, Linn 283
incana Roxb 282
lanata Linn 282
longifolia Lamk 282
macrophylla Vahl 282
rubella Ldl 282
CALLIGONUM 303
polygonoides Linn 306
Callitris 394
quadrivalvis Vent 394
Calluna vulgaris Linn 239
Calophylleæ 21
CALOPHYLLUM 21 24
amœnum Wall 24 25
decipiens Wight 26
elatum Bedd 26
inophyllum Linn 25 iv
longifolium 21
Moonii Wight 25
polyanthum Wall 25
retusum Wall 24
spectabile Willd 25
spurium 26
tetrapetalum, Roxb 25
tomentosum Wight 25 iv
Wightianum Wall 26
Calosanthes indica Bl 275
Calotropis 265
gigantea R Br 265, xxvi
procera, R Br 265
Calpicarpum Roxburghii G Don 261
Calpurnea 116
aurea Lam 134
Cambogia Gutta 24
CAMELLIA 27 30
caudata Wall 30
drupifera Lour
Kissi Wall
lutescens Dyer
Thea Link
theifera Griff
Campanulaceæ
Camphora
Cananga
odorata, Hk f & Th
CANARIUM 66
bengalense Roxb 68
cocc neo-bracteatum Kurz
euphyllum Kurz
strictum, Roxb
Canscora
Cheed Gmelin
scandens Roxb
Ca th m d tymu Gaertn
parviflorum Roxb
Capparea
CAPPARIDEÆ

Pages
CAPPARIS 14
aphylla Roth 15
bisperma Roxb 15
divaricata Lamk 15
grandis Linn 15
heteroclita Roxb 14
horrida Linn 15 ii
multiflora Hk f & Th ii
olacifolia Hk f & Th 15 ii
sepiaria Linn iii
spinosa Linn 14
setosa DC 15
trifoliata Roxb 15
zeylanica Roxb 15 ii
CAPRIFOLIACEÆ 213
Caragana 116 119
CARALLIA 175 177
Calycina Bth 178
integerrima DC 177, xx
lanceæfolia Roxb 177
lucida Roxb 177
zeylanica 178
CARAPA
moluccensis Lam
obovata Bl
CAREYA
arborea Roxb
herbacea Roxb
sphærica Roxb
Carica Papaya Linn
CARISSA
Carandas Linn 61, xxiv
Dalzellii Beddome 261
diffusa Roxb 261
Carisseæ 260 xxv
CARPINUS 390
Betulus Linn 390
faginea Ldl
viminea Wall
Carumbium baccatum Kurz
insigne Kurz
sebiferum Kurz
Carya
alba Nuttall
glabra Torrey
oliviformis Nuttall
Caryophyllus aromaticus Linn

Pages
marginata Roxb 137
nodosa Ham 136
obovata Collodon 136
remigera, Wall 136
Roxburghii DC 137
siamea Lamk 138
timoriensis DC 138
Cassieæ 134
Cassiope 234
fastigiata Don 234
Castanea 389
argentea Bl 388
diversifolia Kurz 388
indica Roxb 388
inermis Lindl 388
javanica Bl 388
lanceæfolia Kurz 388
rhamnifolia Kurz 388
Roxburghii Ldl 388
tribuloides Kurz 389
Vesca Gaertn 389
vulgaris Lam 379
Casuarina 346
equisetifolia Forst 346
muricata Roxb 346
Catalpa bignonioides 271
Catesbœa 219
Cathartocarpus Fistula Pers 136

83
83
83 86
xiii
xiv
87
86 xiii
87
86 xiii
19
323
323 343
343
343 344
343
343
343
344
343
344
343, 344
343
343

Pages.

Cephaëlis Ipecacuanha, Rich. . . . 219
Cephalanthus . . 217, 218
naucleoides, DC. . . 218
Cephalocroton . . 347
indicus, Bedd. . . 348
leucocephalus, Baill. . 348
CEPHALOSTACHYUM 426, 429
capitatum, Munro . 429
latifolium, Munro . 429
pallidum, Munro . 429
pergracile, Munro . 429
schizostachyoides, Kze. 429
Ceratonia siliqua, Linn. 135, 145
Ceratophorus Wightii, Hassk. 215
Ceratostema variegata, Roxb. . . . 233
CERBERA . . 260, 262
Odollam, Gaertn. . . 262
CERIOPS . . 175, 176
Candolleana, Arnott . 176
Roxburghiana, Arnott . 176
Ceropegieæ . . . 265
CHÆTOCARPUS . 347, 366
castaneæcarpus, Thw. 366
pungens . . . 366
CHAILLETIACEÆ . 80
Chailletia . . . 80
gelonioides, Hook. f . 80
Helferiana, Kurz . 80
longipetala, Turcz . 80
macropetala, Turcz . 30
Chamærops . . 415, 418
khasyana, Griff. . 418
Martiana, Wall. . . 418
Ritchieana, Griff . . 418
Chamæbuxus arillata, Hassk. . . . 19
Karensium, Kurz . 19
Championia multiflora, C. B. Clarke . . 274
Chasalia . . 218, 219
curviflora, Thw. . . 219
Chaulmoogra odorata, Roxb. 18
Chavannesia esculenta, DC. 261
CHICKRASSIA . . . 76
tabularis, Adr. Juss. . 76
velutina, Rœmer . . 76
Chilocarpus . . 260, 261
Chionanthus dichotoma, Roxb. . . . xxv
intermedia, Beddome . 259
macrophyllus, Kurz . 259
malabarica, Bedd. . 259
Chisocheton . . . 69
dysoxylifolius, Kurz . 69
grandiflorus, Kurz . 69
paniculatus, Hiern . 69
CHLOROXYLON . . 77
Swietenia, DC. . 77, xii
Chonemorpha . . 260, 261
macrophylla, G. Don. . 261
Choripetalum undulatum, H. DC. . . . 240
Chrysobalaneæ . . 161
CHRYSOPHYLLUM . 241, 242
acuminatum, Roxb. . 242
Roxburghii, G. Don . 242

Cicca disticha, Linn. . 351
Emblica, Kurz . . 352
Leucopyrus, Kurz . 354
obovata, Kurz . . 354
reticulata, Kurz . . 353
CINCHONA . . 218, 220
Calisaya, Weddell . 224
excelsa, Roxb. . . 224
micrantha, . . 223
officinalis, Linn. . . 224
succirubra, Pavon . 223
thyrsiflora, Roxb. . 225
Cinchoneæ . . . 218
CINNAMOMUM . 304, 305
albiflorum, Nees . . 306
Camphora, Nees and Eberm . . . 305
caudatum, Nees . . 305
Cassia, Bl. . . 306
Cecidodaphne, Meissn. 305
glanduliferum, Meissn. 306, 307
impressinervium, Meissn. 305
iners, Rwdt. . . 305
inunctum, Meissn. . 305
obtusifolium, Nees 305, 307
pauciflorum, Nees . 305
Parthenoxylon, Meissn. 305, 307
Perrottetii, Meissn. . 305
pseudo-Sassafras, Meissn. . . . 305
sulphuratum, Nees . 305
Tamala, Nees . . 306
Wightii, Meissn. . 305
Zeylanicum, Breyn. . 305
Cipadessa . . . 68
fruticosa, Bl. . 69, xi
Cissampelideæ . . . 11
Cissampelos . . . 11
convolvulacea, Roxb. . 11
Pareira, Linn. . . 11
Citrus 59
Aurantium, Linn. 59, x
decumana, Willd. . 59
medica, Linn. . 59, x
Claoxylon . . 347, 348
Clausena 59
excavata, Burm. . . x
pentaphylla, DC. . . 59
Willdenovii, W. and A. 59
Cleidion . . . 347
javanicum, Bl. . . 348
CLEISTANTHUS . 347, 357
chartaceus, Müll. Arg . 357
malabaricus, Müll. Arg. 357
myrianthus, Kurz . 357
oblongifolius, Müll. Arg. 357
patulus, Müll. Arg. . 357
stenophyllus, Müll. Arg. 357
stipularis, Müll. Arg. . 357
Clematis barbellata, Edgw. 1
Buchananiana, DC. . 1
gouriana, Roxb. . . 1
grata, Wall. . . 1
grewiiflora, DC. . . 1
montana, Ham. . . 1
nutana, Royle . . 1
orientalis, Linn. . . 1
smilacifolia, Wall. . . 1
Vitalba, Linn. . . 1

CLERODENDRON . 281, 298
bracteatum, Wall. . 299
Colebrookianum, Walp. 299
infortunatum, Linn. . 299
inerme, Gaertn. . . 299
nutans, Wall. . . 299
phlomoides, Linn. . 298
serratum, Spreng. . 299
Siphonanthus, R. Br. . 299
villosum, Bl. . . 299
Cleyera . . . 27, 28
grandiflora, Hook. and Th. 28
ochnacea, DC. . . 28
Cluytia collina, Roxb. . 358
Cnesmone . . 347, 348
javanica, Bl. . . 348
Cnestis ramiflora, Griff . 114
Coccoloba . . . 303
Totnea, Ham. . . 303
Cocculeæ . . . 11
COCCULUS . . 11, 12
indicus . . . 11
laurifolius, DC. . . 12
Leæba, DC. . . 11
villosus, DC. . . 11
COCHLOSPERMUM . . 16
Gossypium, DC. . 16, iii
Cocoineæ . . . 415
COCOS . . . 415, 422
nucifera, Linn. . . 422
Codiæum . . . 347
umbellatum. Müll. Arg. 348
Cœlodepas . . . 347
calycinum, Bedd. . 348
Cœlodiscus . . 347, 348
COFFEA . . 218, 231
arabica, Linn. . . 231
bengalensis, Roxb. . 231
tetrandra, Roxb. . . 231
COLEBROOKIA . . 300
oppositifolia, Sw. . . 300
ternifolia, Roxb. . . 300
Coleospathes . . . 423
Colquhounia . . . 300
coccinea, Wall. . . 300
elegans, Wall. . . 300
vestita, Wall. . . 300
Colubrina . . . 88
asiatica, Brongn. . . 88
Columbia . . . 51
Colutea 116
arborescens, Linn. . 118
nepalensis, Sims . . 118
COMBRETACEÆ . . 178
Combreteæ . . . 178
Combretum . . 178, 179
decandrum, Roxb. . 179
COMPOSITÆ . . . 232
Congea 281
tomentosa, Roxb. . 282
CONIFERÆ . . . 394
Corypнineæ . . . 415
CORYPHA . . 415, 417
elata, Roxb. . . 417
Gebanga, Bl. . . 417
macropoda, Kurz . . 417
Taliera, Roxb. . . 417
umbraculifera, Linn. . 417
CONNARACEÆ . . 114
Connarus . . . 114
paniculatus, Roxb. . 114

Pages

Conocarpus acuminata, Roxb. 186
latifolia Roxb . 185
myrtifolia, Wall 187
Conocephaleæ 323
Conocephalus . 323
suaveolens Bl 324
CONVOLVULACEÆ 273
Conyza balsamifera Rox 232
Copaifera officinalis 1^5
Corallobotrys 233
acuminata, Hook f & Bth . 234
Corchorus 51, 52
capsularis, Linn 52
Cordieæ . 269
Cordia 269, 270
angustifolia, Roxb 271
campanulata Roxb 270
fragrantissima Kurz 271
fulvosa Wight 270
grandis Roxb 270
Macleodii, Hook f and Th 271, xxvi
monoica, Roxb 270
Myxa, Linn { 270, xxvi
octandra DC . 270
Perottetii DC . 270
polygama Roxb 270
Pothii Röm and Sch 271
serrata, Roxb 270
speciosa Willd 270
subcordata Lamk 270
tectonifolia Wall 270
vestita, Hook f and Th . 271
Wallichii, G Don 270
Cordyline 425
terminalis, Kth 425
CORIARIA 113
myrtifolia, Linn 113
nepalensis, Wall 113
sarmentosa 113
CORIARIEÆ 113
CORNACEÆ 210
CORNUS 210, 212
capitata Wall. . . 212
oblonga Wall 212
macrophylla Wall. 212
sanguinea, Linn 212
Corylopsis himalayana, Griff . 174
CORYLUS .
Avellana Linn . 390
Colurna, Linn . 390
ferox, Wall 390
lacera, Wall . . 390
COTONEASTER . 161, 170
acuminata Lindl . 171
bacillaris Wall . 171
buxifolia, Wall. . . 170
frigida, Wall . . 170
microphylla, Wall 171
CRATÆGUS 161, 170
Clarkei, Hook f . . 170
crenulata Roxb . . 170
Oxyacantha Linn . 170
Pyracantha, Persoon 171
CRATÆVA . 62, 15
Nurvala, Ham . 15
religiosa Forst 15, iii
Roxburghii, Ham 15

Pages

CRATOXYLON . . . 21
arborescens Bl 21
formosum Bth. & Hk f 21
neriifolium, Kurz . 21
polyanthum, Korth 21
prunifolium, Kurz . 21
Cricula trifenestrata . xv
Crotalaria . 116
juncea, Linn 117, 265
CROTON 347, 358
argyratus Bl 358, 359
aromaticus Linn 358
burmanicus Müll. Arg 358
calococcus, Kurz 359
caudatus, Müll Arg { 358, 359, xxix
C
C
amygdalina, Nees 304
Cr
Ci
C
Ci
javanensis Trecul 324
Cudranus Rumphii, Thw 324
Cullenia . . 42
excelsa Wight . 42
Cunninghamia . 394
sinensis, R. Br . 394
Cupania . . 93, 94
glabrata Kurz 94
pentapetala W and A 94
CUPRESSUS . 391, 410
funebris Endl . . 410
glauca Lam . 410
Lawsoniana, Murray xxx
sempervirens, Linn . 411
torulosa Don 410
Cupressineæ 391
CUPULIFERÆ . 379

Pages

Cyathea 431
sinuata, Hk and Grev. 431
spinulosa Wall . 431
Cyathocalyx 7
martabanicus, Hk f & Th 8
Cyathostemma . . 7
CYCADACEÆ . 415
Cycas . . 415
circinalis, Linn . 415
circinalis, Willd . 415
pectinata, Griff . 415
Rumphii Miq . 415
siamensis, Miq . 415
sphærica, Roxb . 415
Cyclea . . . 11
Cyclostemon . . . 347
eglandulosus, Kz . 347
. 347
. 347
. 347
. 347
. 161
. 161
304
. 304, 309
. 304
. 116
. 123
. 424
. 424
265
. 134, 144
144
. 144
. 144
144
. 144
. 134
D
lanceolaria, Linn { 124, 128, xvii
latifolia Roxb 124, 127, xvii
monosperma, Dalz . 124
nigrescens Kurz 124, 129
oojeinensis Roxb 129
paniculata, Roxb { 124, 129, xvii
purpurea, Wall 124 128
retiformis, Roxb 124
rimosa, Roxb 124
scandens, Roxb . 133
Sissoo, Roxb 124 xvii
spinosa Roxb 124
stipulacea, Roxb 124, 129

Pages.
sympathetica, Nimmo . 124
tamarindifolia, Roxb. . 124
volubilis, Roxb. . { 121, xvii
Dalbergieæ . . . 116
Dalechampia . . . 347
scandens, Linn. . . 348
Dalhousiea . . . 116
bracteata, Wall. . . 131
Dammara . . . 394
alba, Rumph . . 394
australis, Lamb . . 394
DAPHNE . . 314, 315
cachemiriana, Meissn. . 315
Laureola, Linn. . . 315
longifolia, Meissn. . 315
Mezereum, Linn. . 315
mucronata, Sm. . . 315
,, Royle . 315
oleoides, Schreber . 315
papyracea, Wall. . . 315
pendula, Sm. . . 315
Wallichii, Meissn. . 315
DAPHNIDIUM . . 301, 312
argenteum, Kurz . 312
bifarium, Nees . . 312
caudatum, Nees . . 312
elongatum, Nees . 312
melastomaceum, Nees . 312
pulcherrimum, Nees . 312
venosum, Meissn. . 312
Daphniphyllaceæ . . 347
Daphniphylleæ . . 347
DAPHNIPHYLLOPSIS { 80, 81, xiii
capitata, Kurz . { 81, xiii
Daphniphyllum . . 347
glaucescens, Bl. . . 348
himalayense, Müll. Arg. 254, 348
Datisca cannabina, Linn. 207
DATISCEÆ 207
Decaisnea 12
insignis, Hook. f. and Th. 12
Decaschistia . . . 42
Decaspermum . . 187, 188
paniculatum, Kurz . 188
DEBREGEASIA . 323, 326
bicolor, Wedd. . . 326
leucophylla, Wedd. . 326
longifolia, Wedd. . 326
Deeringia . . . 302
Amherstiana, Wall. . 302
baccata, Miq. . . 302
celosioides, R. Br. . 302
Delima 2
sarmentosa, Linn. . 2
Delimeæ 2
Dendrocalamus . 426, 430
Brandisii, Kurz . . 428
criticus, Kurz . . 431
giganteus, Munro . 430
Hamiltonii, Nees & Arn. 430
Hookeri, Munro . . 430
longispathus, Kurz . 431
membranaceus, Munro. 430
Parishii, Munro . 430, 431
sericeus, Munro . . 430
Dendropanax . . . 208
DERRIS . . . 116, 133
robusta, Bth. . . 133
scandens, Bth. . . 133
uliginosa, Bth. . . 133
DESMODIUM . 116, 120
Cephalotes, Wall. . 121
gyrans, DC. . . 120
gyroides, DC. . . 120
pulchellum, Roxb. 120, xvi
tiliæfolium, G. Don . 120
DEUTZIA . . . 171, 173
corymbosa, Brown . 173
macrantha, Hk. f. & Th. 173
staminea, Brown . . 173
Dicellostyles . . . 42
jujubifolia, Benth. . 42
Dicera 57
DICHOPSIS . . 241, 242
caloneura, Bth. & Hk f. 242
elliptica, Bth. & Hk. f. 242
Gutta, Bth. & Hk. f. . 242
polyantha, Bth. & Hk. f. 242
DICHROA . . . 171, 172
febrifuga, Lour. . . 172
DICHROSTACHYS . 145, 148
cinerea, W. and A. . 148
DILLENIACEÆ . . . 2
DILLENIA 2
augusta, Roxb. . . 3
aurea, Smith . . 3, 4
bracteata, Wight . . 2
indica, Linn. . . 2, i
ornata, Wall. . . 3
parviflora, Griff. . . 2
pentagyna, Roxb. 3, 4, i
pilosa, Roxb. . . 4
pulcherrima, Kurz . 2
repanda, Roxb. . . 2
retusa, Thunb. . . 4
scabrella, Roxb. . . 2
speciosa, Thunb. . . 2
Dillenieæ 2
Dinochloa . . 426, 431
andamanica, Kz. . . 431
Maclellandii, Kz. . 431
Dioclea 116
reflexa, Hook. . . 123
DIOSPYROS . . . 247
Brandisiana, Kurz . 247
burmanica, Kurz 247, 248
buxifolia, Hiern . . 248
chartacea, Wall. . . 248
Chloroxylon, Roxb. . 248
cordifolia, Roxb. . . 248
cordifolia, Willd. . . 251
dasyphylla, Kurz . 247
densiflora, Wall. . . 247
Ebenum, Kön. . { 247, 251, xxiv
ehretioides, Wall. 247, 250
Embryopteris, Pers. { 248, 252, xxv
exsculpta, Ham. . . 249
flavicans, Hiern . . 247
foliolosa, Wall. . . 247
glutinosa, Roxb. . . 252
grata, Wall. . . . 248
hirsuta, Linn. . . 247
Horsfieldii, Hiern. . 247
insignis, Thw. . 247, 248
Kaki, Linn. . . . 248
Kurzii, Hiern . 247, 249
lanceæfolia, Roxb. . 248
Lotus, Linn. . 248, 252
✓ Melanoxylon, Roxb. { 247, 249, xxiv
microphylla, Bedd. 248, 252
montana, Roxb. . 248, 251
nigricans, Wall. . 247, 248
oleifolia, Wall. . . 247
oocarpa, Thw. . 247, 250
orixensis, Wight . . 248
ovalifolia, Wight . 248
paniculata, Dalz. . 247
pilosula, Wall. 247, 248, 253
pruriens, Dalz. . 247, 248
pyrrhocarpa, Miq. . 248, 252
quæsita, Thw. . 247, 250
racemosa, Roxb. . . 248
ramiflora, Roxb. . . 248
sapotoides, Kurz . . 247
stricta, Roxb. . 247, 248
sylvatica, Roxb. . 247, 248
tomentosa, Roxb. . 249
Toposia, Ham. . . 248
Tupru, Buch. . 247, 249
undulata, Wall. 79, 248, 253
vaccinioides, Ldl. . 248
variegata, Kurz . . 247
Wightiana, Bedd. . 249
Diplarche . . . 234
Diplospora . . 218, 219
singularis, Korth . . 219
DIPTEROCARPEÆ . 31
DIPTEROCARPUS . . 31
alatus, Roxb. . 31, 32
costatus, Gaertn. . . 31
grandiflorus, Roxb. . 32
Griffithii, Miq. . . 31
Hasseltii, Bl. . . 31
incanus, Roxb. . . 31
indicus, Bedd. . . 32
lævis, Ham. . . 31, 32
obtusifolius, Teysm. 31, 32
pilosus, Roxb. . . 31
scaber, Ham. . . 31
tuberculatus, Roxb. 31, 32
turbinatus, Gaertn. f. 31, 32
vestitus, Wall. . . 31
zeylanicus, Thwaites . 33
Distegocarpus . . . 379
Distylium indicum, Bth. 174
Dittelasma . . 93, 94
Rarak, Hook. f. . . 94
Dobinæa . . . 93, 94
vulgaris, Ham. . . 94
Docynia 161
Hookeriana, Dcne. . 161
indica, Dcne. . 161, xix
Dodecadenia . . . 301
grandiflora, Nees . 301
DODONÆA . . 93, 101
angustifolia, Linn. . 101
dioica, Roxb. . . 101
viscosa, Linn. . . 101
Dodonæeæ 93
DOLICHANDRONE . 274, 276
arcuata, Hook. f. & Th. 276
crispa, Seem. . . 276
falcata, Seem. . . 276
Rheedii Seem. . . 276
stipulata, Seem. . 276
Dombeyeæ 45
DOONA 31, 41
zeylanica, Thwaites 41

Pages
Dorsten eæ 3?5
Dorst nia 323
Griffithiana Kurz 324
Dracæna 425
angustifolia Roxb 425
atropurpurea Roxb 425
spicata Roxb 4?5
terminalis Roxb 4?5
terniflora Roxb 4?5
Dracontomelum 103 104
mangiferum Bl 104
Drepanocarpus monospermus 1?4
reniformis 1?4
DIMYCARPUS 103 112
racemosus Hook f 112
Dryobalanops Camphora 31
DUABANGA 204
sonneratioides Buch { 2?4, xxi }
Durio 4
Zibethinus DC 42
DYSOXYLUM 71
Beddomei Hiern 71
binectariferum Hk f 71
grande Hiern 71
Hamiltonii Hiern 72
macrocarpum Bl 71
malabaricum Bedd 71
pallens Hiern 71
procerum Hiern 71 xi

E.

EBENACEÆ 247
ECHINOCARPUS 51 56
assamicus Bth 56
dasycarpus Bth 56 xxx
Murex Bth 56
Sigun Bl 56
sterculiaceus Bth 56
tiliaceus 56
tomentosus Bth 56

Edgeworthia 314
Gardneri Meissn 314
Ehretia 269 2?2
aspera Roxb 2?2
buxifolia Roxb 2?2
laevis Roxb 2?2
obtusifolia Hoch 2?
ovalifolia Wight 2?2
serrata Roxb 2?2
Wallichiana Hook f and Th xxx
Wightiana Wall 2?
Ehretieæ 2?9
Ekebergia indica Roxb ?
ELÆAGNEÆ 31?
ELÆAGNUS 31?
angustifolia Linn 31?
arborea Roxb 31?
conferta Roxb 31?
hortensis M Bieb 317
latifolia Linn 31?
Moorcroftii Wall 31?
umbellata Thunberg 318

ELÆOCARPUS 51, 6?
ferrugineus Wight 57
floribundus Bl 57
Ganitrus Roxb 5?
lanceæfolius Roxb 57
oblongus Gaertn 57
robustus Bl 57
rugosus Roxb 57
serratus Linn 57
tuberculatus Roxb 57
Varunna Ham 57
Elæodendron 83
ELÆODENDRON 83 87
glaucum Pers 87
Roxburghii W & A { 87, xiv }
Elettaria Cardamomum Maton 415
Ellertonia 260 261
Ellipeia 7
ferruginea Hook f and Th 8
ELSCHOLTZIA 300 301
polystachya Benth 301
Embelia floribunda Wall 240
Ribes Burm 240
robusta Roxb { 240, xxiv }
Embryopteris glutinifera Roxb ?
ENGELHARDTIA 393
Colebrookiana Lindl 393
Roxburghiana Lindl 393
spicata Bl 393
villosa Kurz 39?
ENKIANTHUS 234 235
himalaicus Hook f and Th 235
Entada 14?
Pursætha DC 145
scandens Bth 145
EPACRIDEÆ 238
Ephedra 393
Alte C A Meyer 394
[illegible] 394
260 2?1
23?
51 ?
?
161 16?
bengalensis Hook 167
dubia Dene 16?
[illegible] Kurz 16?
elliptica Lindl 16?
integrifolia Kurz 16?
japonica Lindl 16?
petiolata Hook 167
Eriodendron 4
anfractuosum DC 4
orientale Steud 4
Eriglossum 93 94
edule Bl 94
rubiginosum Bl ?
ERIOLÆNA 4? 4?
Candollei Wall 51
Hookeriana W & A { ?, vii }
quinquelocularis Wight ?
spectabilis Planch ?
Stocksii Hk f & Th ?
Wallichii DC ?
Eriosemeæ 45

Erycibe ?3
glomerata Wall 2?3
paniculata Roxb xxvi
Erysiphe Martii Lev 3?9
ERYTHRINA 116 1?1
arborescens Roxb 1?2
holosericea Kurz 121
indica Lam 122 xvi
lithosperma Miq 1?1
ovalifolia Roxb 1?1
resupinata Roxb 121
stricta Roxb 12?
suberosa Roxb 121 xvi
Erythropalum 80
populifolium Mast 80
scandens Bl 80
vagum Mast 80
ERYTHROXYLON 5? ?8
burmanicum Griff 58
Coca 58
indicum Bedd 58
Kunthianum Wall 58
monogynum Roxb 58 vii
Escallonieæ 171
Eucæsalpinieæ 134
EUCALYPTUS 187 188
Globulus Lab 188
leucoxylon F Mull 188
obliqua L Her 188
rostrata Schlect 188
saligna Smith 188
Stuartiana F Mull 188
tereticornis Sm 188
viminalis Lab 188
Euchresta 116
Horsfieldii Bennett 134
EUGENIA 187 1?0
acuminatissima, Kurz 191
alba Roxb 1?1
albiflora Duthie 1?1
alternifolia Wight 19? 1?3
amplexicaulis Roxb 1?1
angustifolia Roxb 1?1
aquea Burm 1?1
Rumph 1?3
areolata DC 1?2
argentea Bedd 1?2
Arnottiana Wight 191 1?3
balsamea Wight 1?2
Beddomei Duthie 1?
bifaria Wall 1?2
brachiata Roxb 1?2
bracteata, Roxb 1?2
bracteolata Wight 1?2
calcadensis Bedd 1?2
calophyllifolia Wight 1?
caryophyllifolia Roxb 1?1
caryophyllæa, Wight 1?
cerasiflora Kurz 1?3
cinerea Kurz 1?2
claviflora Roxb 1?1
codyensis Munro 1?
contracta Kurz 1?
cuneata, Beddome 1?
cuneata, Wall 1?2
cymosa, Lam 1?1
cymosa Roxb 1?3
dyospyrifolia Wall 1?1
floccosa Bedd 1?
formosa, Wall { 1?1, 1?1, xx }
frondosa Wall 1?

Page.

[illegible], Roxb. . 192, [illegible]
[illegible] . . 192
[illegible], Roxb. . 192
[illegible], Wight . 191, [illegible]
[illegible], Wall. . . [illegible]
Helferi, [illegible] . . 194
[illegible], Wight . 191
Heyneana, Wall. . . { 192 / [illegible]
[illegible], Roxb. . . { [illegible] / 191
Jambolana, Lamk. . { 192 / 194 / xx
Jambos, Linn. . 191, 19[illegible]
javanica, Lamk. . . 191
[illegible], Duthie . . 192
[illegible], Duthie . . 192
Kurzii, Duthie . 191, 19[illegible]
laeta, Ham. . . . 191
lanceaefolia, Roxb. 191, 19[illegible]
[illegible], Roxb. . 191
[illegible], Wight . 192
[illegible], Roxb. . 191
[illegible], Wall. . 191
leptantha, Wight . . 191
[illegible], Thw. . 192
[illegible], Roxb. . 191
macrosepala, Duthie . 192
malaccensis, Linn. 191, 193
malabarica, Bedd. . 192
mangifolia, Wall. 191, 193
microphylla, Bedd. . 193
montana, Wight . . 192
Mooniana, Wight . . 192
Munronii, Wight . . 191
myrtifolia, Roxb. . . 191
[illegible], DC. . . 194
oblata, Roxb. . . 192
obovata, Wall. . 192, 194
obtusifolia, Roxb. . 192
occlusa, Miq. . . 192
operculata, Rox. 192, 194, xx
pachyphylla, Kurz . 191
Paniala, Roxb. . . 192
pellucida, Duthie . 192
polyantha, Wight . 192
polypetala, Wight . 191
praecox, Roxb. . . 191
ramosissima, Wall. 191, 193
revoluta, Wight . . 192
Rottleriana, W. and A. 192
rubens, Roxb. . . 191
rubicunda, Wight . 192
rubricaulis, Miq. . 192
salicifolia, Wight . 195
singampattiana, Bedd. 192
spicata, Linn. . . 192
Stocksii, Duthie . . 192
sylvestris, Wight . 195
ternifolia, Roxb. . . 193
tetragona, Wight 192, 194
Thumra, Roxb. . . 191
toddaliafolia, Wight . 191
toddalioides, Wight . 191
tristis, Kurz . . 193
venusta, Roxb. . . 192
Wallichii, Wight . 191
Wightiana, Wight . 192
Wightii, Bedd. . . 191
Wynadensis, Bedd. . 192
zeylanica, Wight { 192 / xx

Page.

[illegible] . . . 115
[illegible] . . . 358
[illegible] . . . 87
EUONYMUS . . 83, 84
[illegible], Roxb. . 84
[illegible], Wall. . 84
[illegible], Wall. . . 84
[illegible], Wall. . . 84
[illegible], Roxb. . 84
glaber, Roxb. . . 84
[illegible], Wall. . 84
Hamiltonianus, Wall. . 84
[illegible], Ham. . . 84
[illegible], Wall. . . 84
[illegible], Kurz . 83
[illegible], Wall. . 83, 84
[illegible], Wall. . 84, 85
EUPHORBIA . . 357, 358
antiquorum, Linn. . 358
Cattimandoo, Elliot . 358
epiphylloides, Kurz . 358
ligularia, Roxb. . . 358
neriifolia, Linn. . 358
[illegible], Roxb. . 358
Nivulia, Ham. . . 358
[illegible], Roxb. . 358
[illegible], Willd. . 358
Royleana, Boissier . 358
[illegible], Roxb. . 358
Tirucalli, Linn. . 358, xxix
tortilis, Rottler . . 358
trigona, Roxb. . . 358
EUPHORBIACEÆ 346, 347
Euphoria longana, Lamk. 97
Euptelea 4
pleiosperma, Hk. f. & Th. 4
EURYA . . . 27, 28
acuminata, DC. . . 28
japonica, Thunb. . . 28
symplocina, Bl. . . 28
trichocarpa, Korth. . 28
Eurycoma 63
longifolia, Jack. . . 63
EVODIA . . . 59, 60
fraxinifolia, Hook. f. . 60
meliaefolia, Bth. . 60
Roxburghiana, Bth. . 60
rutaecarpa, Hk. f. & Th. 60
triphylla, Beddome . 60
viticina, Wall. . . 60
EXCOECARIA . . 347, 366
acerifolia, F. Didr. . 368
Agallocha, Willd. 366, 368
baccata, Müll. Arg. 366, 367
cochinchinensis, Lour. 366
holophylla, Kurz . 366
indica, Müll. Arg. 366, 367
insignis, Müll. Arg. 366, 367
oppositifolia, Jack. . 366
sebifera, Müll. Arg. . 366
virgata, Miq. . . 366

F.

Fagara Rhetsa, Roxb. 60, viii
triphylla, Roxb. . . 60
FAGRÆA 267
auricularia, Jack. . 267
carnosa, Jack. . . 267
coromandelina, Wight 267
fragrans, Roxb. . . 267
obovata, Wall. . . 267
racemosa, Jack. . . 267

Page.

Fagus sylvatica, Linn. . 581
Falconeria insignis, Royle 357
FERONIA . . . 59, 62
Elephantum, Correa 62, x
Ferreola buxifolia, Willd. 217
[illegible] . . . 11
[illegible] . . . 323
FICUS . . . 323, 332
bengalensis, Linn. { 333 / xxviii
Benjamina, Willd. . 334
,, Linn. . 338
Carica, Linn. . . 333
caricoides, Roth. . 338
Chittagonga, Miq. . 333
clavata, Wall. . xxviii
[illegible], Roxb. . 338
cordifolia, Roxb. . . 335
Cunia, Buch. 339, xxviii
daemonum, König . 340
elastica, Bl. . . 334
Forbesii, Miq. . xxviii
foveolata, Wall. . . 339
glomerata, Roxb. 339, xxviii
hirsuta, Roxb. . . 332
Hirta, Roxb. . . 332
hispida, Linn. 340, xxviii
[illegible], Roxb. . . 333
infectoria, Willd. 334, xxviii
laccifera, Roxb. . . 332
macrophylla, Roxb. . 340
mysorensis, Roth. . 332
nemoralis, Wall. . 338
nitida, Thunb. . . 336
obtusifolia, Roxb. . 332
oppositifolia, Roxb. . 340
parasitica . . . 333
racemosa, Skinner . 339
regia, Miq. . . . 340
religiosa, Linn. 334, xxviii
reticulata, Miq. . . 339
retusa, Linn. 336, xxviii
Roxburghii, Miq. . 332
Roxburghii, Wall. 340, xxviii
Rumphii, Kurz . . 335
tomentosa, Willd. . 332
triloba, Ham. . . 332
venosa, Ham. . . 334
virgata, Roxb. 338, xxviii
Wightiana, Wall. . 332
FILICES . . . 431
FILICIUM . . . 65, 68
decipiens, Thwaites . 68
Finlaysonia . . . 265
,, obovata, Wall. . . . 265
FLACOURTIA . . . 17
Cataphracta, Roxb. . 17
inermis, Roxb. . . 17
mollis, Hook. f. & Th. . 17
montana, Grah. . . 17
obcordata, Bedd. . . 17
Ramontchi, L'Herit. 17, iii
rotundifolia . . . 17
sapida, Roxb. . . 17
sepiaria, Roxb. . 17, iii
sumatrana, Planch. . 17
Flacourtieæ . . . 16
Flemingia . . . 116
Chappar, Ham. . . xvii
congesta, Roxb. . . 123
semialata, Roxb. . . 123
strobilifera, R. Br. . xvii

Pages

Fraxineæ . . 254
Fraxinus . 254, 256
excelsior, Linn . 256, 257
floribunda, Wall 256
Moorcroftiana, Wall 256
Freycinetia 425
insignis, Bl 425

G.

Cowa, Roxb ..3, 24
dulcis Kurz . . 23
elliptica Wall . . 22
Gutta, Wight . 24
heterandra Wall 22
indica, Choisy . 22
Kydia, Roxb . 21
lanceafolia, Roxb 22
loniceroides, T And 22
Mangostana, Linn . 22
merguensis, Wight . 23
microstigma, Kurz . 23
Morella, Desrouss 22, 24, iii
ovalifolia, Hook f 23
paniculata, Roxb . 22
pedunculata, Roxb 22
[illegible]
pinnata Roxb . 66, xxi
Gastonia palmata . 208

Pages

Gaultheria . . 234
fragrantissima, Wall 234
Griffithiana, Wight 234, xxiv
punctata, Bl . 234
Gelonium 347
lanceolatum, Willd xxix
Genisteæ 116
GERANIACEÆ 58
Geranium 58
lucida Kurz ...
nervosa, Planch 324
reticulata Thw 324
Thomsoni, King . 324
GIVOTIA 347, 365
rottleriformis, Griff 365
Glochidion lanceolarium, Dalz 351
nepalense, Kurz . 351
Glossocarya . . 281
mollis, Wall 282
GLUTA . 103, 104, 109
elegans, Wall 109
tavoyana, Wall 109
travancorica, Beddome 109
Glycosmis . 50
pentaphylla, Correa 50, x
. 83
. 83
. 83
83
..1, 235
..5, xxvii
. 295
. 295
293
. 293
. 293
. 293
. 293
. 293
. 293
. 80
. 80
. 80
. 80
. 80
. 80
. 65
. 65
. 65
. 7
..da.
..lis, Hk f and Th 11
Gonocaryum . . 80

Pages.

GOODENOVIEÆ . . 233
Gordonia 27, 28
excelsa, Bl . 28
floribunda, Wall 29
integrifolia, Roxb 29
oblata, Roxb . . 29
obtusa Wall . 28
Gordonieæ . 27
Gossypium . 41
Stocksii, Masters 41
88
88
. 89
426
318
51, 56
. 54
. 55
54
. 53
. 56
53
55
53
. 53
55
54
pilosa, Lam 56, vii
populifolia, Vahl 54
salvifolia, Heyne 55, vii
sapida, Roxb 53
scabrophylla, Roxb 53
sclerophylla Roxb 53
sepiaria, Roxb . 55
sinuata, Wall . 53
tiliæfolia, Vahl 54 vii
ulmifolia Roxb . 57
vestita, Wall 55, vii
villosa, Willd . 53
Grewieæ 51
Grislea tomentosa, Roxb 281
Guarea Alliaria Ham 72
binectarifera, Roxb . 71
Gobara Ham . 72
Gotadhora, Ham . 71
paniculata, Roxb . 69
Guazuma . . 45
tomentosa, Kunth . 45
GUETTARDA . . 218, 219
speciosa, Linn . . 220
Guettardeæ . . 218
GUTTIFERÆ . . 21
Gymnema 265
acuminatum Wall . 265
tingens W & A . 265
Gymnosporia . . 83
acuminata, Hook f . xiii
emarginata Roth xiv
montana, Lawson . 87
Royleana, Wall . 86
Thomsoni Kurz . . xiii
Gynaion vestitum . 271
GYNOCARDIA . 16, 18
odorata, R. Br . . 18
Gynochthodes . 218, 219
macrophylla, Kurz 219
Gynotroches axillaris Bl. 175
Gyrinops Wala, Gaertn 315
Gyrocarpeæ . . 173
GYROCARPUS . . 173, 187
Jacquini, Roxb . 187

Pages.

H.

Haasia 304
Wightii, Nees . . 304
Hæmatocarpus . . 11
Hæmatoxylon Campechianum, Linn. . . 135
Hakea 318
HAMAMELIDEÆ . . 174
Hamelia 219
Hamiltonia . . 218, 219
suaveolens, Roxb. 219, xxiv
HARDWICKIA . 134, 143
binata, Roxb. . . 143
pinnata, Roxb. . . 143
Harina oblongifolia, Griff. . . 419
Harpullia . . 93, 94
cupanioides, Roxb. . 94
imbricata, Bl. . . 94
Harrisonia . . . 63
Bennettii, Hook. . 63
Hastingia coccinea, König . . . 282
HEDERA . . 208, 210
Helix, Linn. . . 210
Hedereæ . . . 208
Hedyotideæ . . . 218
Hedyotis 218
Hedysareæ . . . 116
Hedysarum Alhagi, Rox. 119
Cephalotes, Roxb. . 121
gyrans, Roxb. . . 120
lagenarium, Roxb. . 119
pulchellum, Roxb. . 120
tuberosum, Roxb. . 123
umbellatum, Roxb. . 121
HELICIA 318
attenuata, Bl. . . 318
cochin-chinensis, Lour. 318
excelsa, Bl. . . . 318
nilagirica, Bedd. . 318
pyrrhobotrya, Kurz . 318
robusta, Wall. . . 318
salicifolia, Presl. . 318
Helictereæ . . . 45
HELICTERES . . 45, 49
elongata, Wall. . . 49
Isora, Linn. . . 49, vii
spicata, Colebr. . . 49
Helinus 88
lanceolatus, Brandis . 88
Heliotropieæ . . . 269
Heliotropium peruvianum, Linn. . . . 269
HELWINGIA . . 208, 209
himalaica, Hk. f. & Th. 209
Hemicyclia . . . 347
andamanica, Kurz . 347
elata, Bedd. . . 347
sepiaria, W. & A. . 347
sumatrana, Müll. Arg. 347
venusta, Wight . . 347
Hemidesmus indicus, R. Br. 266
Hemigyrosa . . . 93
canescens, Thw. . . 93
deficiens, Bedd. . . 93
Hemitelia . . . 431
Brunoniana, C.B. Clarke 431
decipiens, J. Scott . 431
Henslowia . . . 320
heterantha, Hook. f. . 320

Pages.

HEPTAPLEURUM . 208, 209
elatum, C. B. Clarke . 209
glaucum, C. B. Clarke . 209
hypoleucum, Kurz . 209
impressum, C. B. Clarke { 209, xxii
khasianum, C.B.Clarke 209
racemosum, Bedd. . 209
rostratum, Bedd. . 209
tomentosum, Ham. . 209
venulosum, Seem. 209, xxii
Wallichianum, C. B. Clarke . . . 209
HERITIERA . . 45, 47
Fomes, Buch. . . 47
minor, Roxb. . . 47
littoralis, Dryand. . 47
Papilio, Bedd. . . 48
Hermannieæ . . . 45
Hernandia . . . 304
peltata, Meissn. . . 304
Hernandieæ . . . 304
Heteropanax . . . 208
fragrans, Seem. . . 208
Heteropetalæ . . . 51
HETEROPHRAGMA 274, 277
adenophylla, Seem. . 277
Roxburghii, DC. . 277
sulfurea, Kurz . . 277
Hevea braziliensis, Müll. Arg. 348
Heynea . . . 68, 69
affinis, Juss. . . 69
trijuga, Roxb. . 69, xi
Hibisceæ . . . 42
HIBISCUS . . . 42
collinus, Roxb. . . 42
fragrans, Roxb. . . 42
Lampas, Roxb. . . 43
macrophyllus, Roxb. 42, vi
mutabilis, Linn. . . 42
populneus, Willd. . 43
rosa-sinensis, Linn. . 42
scandens, Roxb. . . 42
setosus, Roxb. . . 24
syriacus, Linn. . . 42
tetralocularis, Roxb. . 43
tiliaceus, Linn. . . 42
tricuspis, Banks . . 42
Hippocratea . . . 83
arborea, Roxb. . . 83
indica, Willd. . . 83
HIPPOPHAË . . 316, 317
rhamnoides, Linn. . 317
salicifolia, Don . . 317
Hiptage 58
acuminata, Wall. . . 58
candicans, Hook. f. . 58
Madablota, Gaertn. . 58
obtusifolia, DC. . . 58
parvifolia, W. and A. . 58
HOLARRHENA . 260, 263
antidysenterica, Wall. { 263, xxvi
mitis, R. Br. . . 263
pubescens . . . 263
HOLIGARNA . . 103, 112
albicans, Hook. f. . 112
Arnottiana, Hook. f. . 112
Beddomei, Hook. f. . 112
ferruginea, Marchand . 112
Grahamii, Hook. f. . 112

Pages.

Helferi, Hook. f. . . 112
longifolia, Roxb. . . 112
longifolia, Wt. and Arn. 112
racemosa, Roxb. . . 112
Hollböllia . . . 12
latifolia, Wall. . . 12
Holmskioldia . . . 281
sanguinea, Retz . . 282
Holochilus micranthus, Dalz. . . . 247
Holoptelea integrifolia, Plch. . . . 342
HOMALIUM . . 205, 207
Griffithianum, Kurz . 207
minutiflorum, Kurz . 207
nepalense, Bth. . . 207
propinquum, C.B.Clarke 207
tomentosum, Bth. . 207
travancoricum, Bedd. . 207
Schlichii, Kurz . . 207
zeylanicum, Bth. . . 207
HOMONOYA . . 347, 364
retusa, Müll. Arg. . 364
riparia, Lour. . . 364
symphylliæfolia, Kurz . 364
HOPEA . . . 31, 39
eglandulosa, Roxb. . 40
glabra, W. and A. . 40
grandiflora, Wall. . 33
gratissima, Wall. . 34
Griffithii, Kurz . . 40
longifolia, Dyer . . 39
oblongifolia, Dyer . 40
odorata, Roxb. . . 40
parviflora, Beddome . 40
racophlœa, Dyer . . 40
Scaphula, Roxb. . . 33
Wightiana, Bedd. . 40
Wightiana, Wall. . . 40
Hovenia 88
dulcis, Thunb. . . 88
Hugonia Mystax, Linn. . 57
Humboldtia . . 134, 135
Brunonis, Wall. . . 135
unijuga, Beddome . 135
Vahliana, Wight . . 135
Humea elata, Roxb. . 52
Hunteria 260
Roxburghiana, Wight . 261
Hydnocarpus . . . 16
alpina, Wight . . 16
castanea, Hook. f. and Th. 16
heterophylla, Bl. . 16
inebrians, Vahl . . 16
Wightiana, Bl. . . 16
Hydnophytum . . 218, 219
formicarum, Jack. . 219
HYDRANGEA . . 171, 172
altissima, Wall. . . 172
aspera, Don . . . 172
Hortensia, DC. . . 172
robusta, Hook. f. & Th. 172
stylosa, Hook. f. & Th. 172
vestita, Wall. . . 172
Hydrangeæ . . . 171
Hymenocardia . . . 347
plicata, Kurz . . 347
Wallichii, Tul. . . 347
HYMENODICTYON . 218, 223
excelsum, Wall. 224, xxiii
flaccidum, Wall. . . 224
obovatum, Wall. . . 224
thyrsiflorum, Wall. . 225

Pages
Hymenopogon 218
parasiticus Wall 218
Hymenopyramis 231
brachiata Wall 232
Hyperanthera Moringa Roxb 114
HYPERICINEÆ 21
Hypericum 21
cernuum Roxb 21
Hookerianum W & A 21
Hypobathrum 218
racemosum Kurz 218
strictum, Kurz 219
Hyptianthera 218 219
stricta W & A 219 xxiii

I.

Icacineæ 80
Ichnocarpus 260 261
ILEX 81 82 83
Aquifolium Linn 82
cymosa Bl 82
daphniphylloides Kurz 81
denticulata Wall 82
dipyrena Wall 81 82
embelioides Hook f 82
excelsa Wall 82
exsulca Wall 82
fragilis Hook f 82
Gardneriana Wight 82
gaultheriæfolia Kurz 82
Godajam Colebr 82
Griffithii Hook f 82

Pages
Iodinum 16
Ipomœa 273
Isonandra 211 212
calophura Kurz 212
Gutta Hook 212
obovata Griff 212
polyandra Wight 212
polyantha Kurz 212
Wightiana DC 212
Itea 171
Chinensis Hook and Arn 172
macrophylla Wall 172
nutans Royle 171
Ixonanthes khasiana Hook f 58
IXORA 218 230
acuminata Roxb 230
Bandhuca Roxb 230
barbata Roxb 230
coccinea Linn 230
compactiflora Kurz 231
naucleiflora Kurz 231
parviflora Vahl 230 xxiii
Pavetta Roxb 230
polyantha Wight 230
recurva Kurz 231
stricta Roxb 230
tomentosa Roxb 231
undulata Roxb 230
villosa Roxb 230
weberæfolia Kurz 231
Ixoreæ 218

191 193
254
254 255
255
255
255

Pages
K.

Kadsura 4
KANDELIA 175 176
Rheedii W and A 176
KAYEA 21 22
floribunda Wall 22
nervosa T And 22
stylosa Thw 22
Kendrickia 193
Kleinhovia 45
Hospita Linn 45
Kokoona littoralis Lawson 8
Kopsia 260
fruticosa DC. 261
Korthalsia 415 414
laciniosa Mast 414
scaphigera Mast 414
Kurrimia 83
paniculata Wall 83
pulcherrima Wall 83
robusta Kurz 83
KYDIA 42 43
calycina Roxb 43 vi
fraterna Roxb 43
glabrescens, Mast 43

L.

LABIATÆ 300
LAGERSTRŒMIA 200
calyculata Kurz 200
Flos Reginæ Retz 202
floribunda, Jack 200
grandiflora Roxb 201
hypoleuca, Kurz 203
indica, Linn 200
lanceolata Bedd 201
lanceolata Wall 201
macrocarpa Wall 203
microcarpa, Wight 201

ILICINEÆ 81
Illicium 4
Griffithii Hook f & Th 4
majus Hook f & Th 4
Illigera 178 179
appendiculata Bl 179
Coryzadenia Meissn 179
khasiana C B Clarke 179
Kurzii C B Clarke 179
Impatiens 58
INDIGOFERA 116 117
atropurpurea Ham 117
Dosua Ham xvi
Gerardiana Wall 117
heterantha Wall 117
pulchella Roxb 117 xvi
stachyodes Lindl xvi
tinctoria Linn 117
Inga cynometroides Bedd 145
dulcis Willd 145
xylocarpa DC 148
Ingeæ 14
Inula
Cappa DC 23
eupatorioides DC 23
Indigofera 23
Iodes 81

JATROPHA 347
Curcas Linn 365
glandulifera Roxb
multifida Linn
nana Dalz
Wightiana Mull Arg
Jonesia Asoca Roxb
triandra Roxb
JUGLANDEÆ 391
JUGLANS 391
cinerea Linn 39
nigra Linn
pterococca Roxb 393
regia, Linn 39 xix
JUNIPERUS 394 411
bermudiana Linn 411
communis Linn 411
drupacea Labill 411
excelsa M Bieb 41
recurva Ham 412
virginiana, Linn 411
Wallichiana Hook f and Th 412
Justicia 250
Adhatoda Linn 251
Gendarussa Linn 251
Justiciem 250

dubia Roxb 282
Laportea 323
crenulata Gaudich 323
Lardizabaleæ 12
LARIX 394 400
europæa, DC 400
Griffithii H f and Th 410
sibirica Ldb 410
Lasianthus 218 19
Lasiosiphon 314
eriocephalus Dcne 315
LAURACEÆ 384 317
Laurus
bilocularis Roxb 320
Cassia Roxb 32
lanceolaria Roxb 328
obtusifolia Roxb 32
rugosa, Roxb 328

Pages.

H.

Haasia 304
Wightii, Nees . . 304
Hæmatocarpus . . 11
Hæmatoxylon Campechianum, Linn. . . 135
Hakea 318
HAMAMELIDEÆ . . 174
Hamelia 219
Hamiltonia . . 218, 219
suaveolens, Roxb. 219, xxiv
HARDWICKIA . 134, 143
binata, Roxb. . . 143
pinnata, Roxb. . . 143
Harina oblongifolia, Griff. . . . 419
Harpullia . . 93, 94
cupanioides, Roxb. . 94
imbricata, Bl. . . 94
Harrisonia . . . 63
Bennettii, Hook. . 63
Hastingia coccinea, König . . . 282
HEDERA . . 208, 210
Helix, Linn. . . 210
Hedereæ . . . 208
Hedyotideæ . . . 218
Hedyotis 218
Hedysareæ . . . 116
Hedysarum Alhagi, Rox. 119
Cephalotes, Roxb. . 121
gyrans, Roxb. . . 120
lagenarium, Roxb. . 119
pulchellum, Roxb. . 120
tuberosum, Roxb. . 123
umbellatum, Roxb. . 121
HELICIA 318
attenuata, Bl. . . 318
cochin-chinensis, Lour. 318
excelsa, Bl. . . . 318
nilagirica, Bedd. . 318
pyrrhobotrya, Kurz . 318
robusta, Wall. . . 318
salicifolia, Presl. . . 318
Helictereæ . . . 45
HELICTERES . . 45, 49
elongata, Wall. . . 49
Isora, Linn. . . 49, vii
spicata, Colebr. . . 49
Helinus 88
lanceolatus, Brandis . 88
Heliotropieæ . . . 269
Heliotropium peruvianum, Linn. . . . 269
HELWINGIA . . 208, 209
himalaica, Hk. f. & Th. 209
Hemicyclia . . . 347
andamanica, Kurz . 347
elata, Bedd. . . 347
sepiaria, W. & A. . 347
sumatrana, Müll. Arg. 347
venusta, Wight . . 347
Hemidesmus indicus, R. Br. 266
Hemigyrosa . . . 93
canescens, Thw. . . 93
deficiens, Bedd. . . 93
Hemitelia 431
Brunoniana, C.B. Clarke 431
decipiens, J. Scott . 431
Henslowia 320
heterantha, Hook. f. . 320

Pages.

HEPTAPLEURUM . 208, 209
elatum, C. B. Clarke . 209
glaucum, C. B. Clarke . 209
hypoleucum, Kurz . 209
impressum, C. B. Clarke . 209, xxii
khasianum, C.B.Clarke 209
racemosum, Bedd. . 209
rostratum, Bedd. . 209
tomentosum, Ham. . 209
venulosum, Seem. 209, xxii
Wallichianum, C. B. Clarke . . . 209
HERITIERA . . 45, 47
Fomes, Buch. . . 47
minor, Roxb. . . 47
littoralis, Dryand. . 47
Papilio, Bedd. . . 48
Hermannieæ . . . 45
Hernandia . . . 304
peltata, Meissn. . . 304
Hernandieæ . . . 304
Heteropanax . . . 208
fragrans, Seem. . . 208
Heteropetalæ . . . 51
HETEROPHRAGMA 274, 277
adenophylla, Seem. . 277
Roxburghii, DC. . 277
sulfurea, Kurz . . 277
Hevea braziliensis, Müll. Arg. 348
Heynea . . . 68, 69
affinis, Juss. . . 69
trijuga, Roxb. . 69, xi
Hibisceæ 42
HIBISCUS 42
collinus, Roxb. . . 42
fragrans, Roxb. . . 42
Lampas, Roxb. . . 43
macrophyllus, Roxb. 42, vi
mutabilis, Linn. . . 42
populneus, Willd. . 43
rosa-sinensis, Linn. . 42
scandens, Roxb. . . 42
setosus, Roxb. . . 24
syriacus, Linn. . . 42
tetralocularis, Roxb. . 43
tiliaceus, Linn. . . 42
tricuspis, Banks . . 42
Hippocratea . . . 83
arborea, Roxb. . . 83
indica, Willd. . . 83
HIPPOPHAË . . 316, 317
rhamnoides, Linn. . 317
salicifolia, Don . . 317
Hiptage 58
acuminata, Wall. . 58
candicans, Hook. f. . 58
Madablota, Gaertn. . 58
obtusifolia, DC. . . 58
parvifolia, W. and A. . 58
HOLARRHENA . 260, 263
antidysenterica, Wall. . . 263, xxvi
mitis, R. Br. . . 263
pubescens . . . 263
HOLIGARNA . . 103, 112
albicans, Hook. f. . 112
Arnottiana, Hook. f. . 112
Beddomei, Hook. f. . 112
ferruginea, Marchand . 112
Grahamii, Hook. f. . 112

Pages.

Helferi, Hook. f. . . 112
longifolia, Roxb. . . 112
longifolia, Wt. and Arn. 112
racemosa, Roxb. . . 112
Hollböllia . . . 12
latifolia, Wall. . . 12
Holmskioldia . . . 281
sanguinea, Retz . . 282
Holochilus micranthus, Dalz. . . . 247
Holoptelea integrifolia, Plch. . . . 342
HOMALIUM . . 205, 207
Griffithianum, Kurz . 207
minutiflorum, Kurz . 207
nepalense, Bth. . . 207
propinquum, C.B.Clarke 207
tomentosum, Bth. . 207
travancoricum, Bedd. . 207
Schlichii, Kurz . . 207
zeylanicum, Bth. . . 207
HOMONOYA . . 347, 364
retusa, Müll. Arg. . 364
riparia, Lour. . . 364
symphylliæfolia, Kurz . 364
HOPEA . . . 31, 39
eglandulosa, Roxb. . 40
glabra, W. and A. . 40
grandiflora, Wall. . 33
gratissima, Wall. . 34
Griffithii, Kurz . . 40
longifolia, Dyer . . 39
oblongifolia, Dyer . 40
odorata, Roxb. . . 40
parviflora, Beddome . 40
racophlœa, Dyer . . 40
Scaphula, Roxb. . . 33
Wightiana, Bedd. . 40
Wightiana, Wall. . 40
Hovenia 88
dulcis, Thunb. . . 88
Hugonia Mystax, Linn. . 57
Humboldtia . . 134, 135
Brunonis, Wall. . . 135
unijuga, Beddóme . 135
Vahliana, Wight . . 135
Humea elata, Roxb. . 52
Hunteria 260
Roxburghiana, Wight . 261
Hydnocarpus . . . 16
alpina, Wight . . 16
castanea, Hook.f.and Th. 16
heterophylla, Bl. . 16
inebrians, Vahl . . 16
Wightiana, Bl. . . 16
Hydnophytum . 218, 219
formicarum, Jack. . 219
HYDRANGEA . . 171, 172
altissima, Wall. . . 172
aspera, Don . . 172
Hortensia, DC. . . 172
robusta, Hook. f. & Th. 172
stylosa, Hook. f. & Th. 172
vestita, Wall. . . 172
Hydrangeæ . . . 171
Hymenocardia . . . 347
plicata, Kurz . . 347
Wallichii, Tul. . . 347
HYMENODICTYON . 218, 223
excelsum, Wall. 224, xxiii
flaccidum, Wall. . . 224
obovatum, Wall. . . 224
thyrsiflorum, Wall. . 225

Pages
Hymenopogon 218
parasiticus Wall 218
Hymenopyramis 281
brachiata Wall 282
Hyperanthera Moringa Roxb 114
HYPERICINEÆ 21
Hypericum 21
cernuum Roxb 21
Hookerianum W & A 21
Hypobathrum 218
racemosum Kurz 218
strictum, Kurz 219
Hyptianthera 218 219
stricta W & A 219 xxiii

I.

Icacineæ 80
Ichnocarpus 260 261
ILEX 81 82 83
Aquifolium Linn 82
cymosa Bl 82
daphnophylloides Kurz 81
denticulata, Wall 82
dipyrena Wall 81 82
embelioides, Hook f 82
excelsa Wall 82
exsulca Wall 8
fragilis Hook f 82
Gardneriana Wight 82
gaultheriæfolia Kurz 82
Godajam Colebr 82
Griffithii Hook f 82
insignis Hook f 81 83
intricata Hook f 82
malabarica Bedd 81
odorata Ham 81 82 83
paraguayensis 82
sulcata Wall 8
theæfolia Wall 82 83
Thomsoni Hook f 82
venulosa Hook f 82
Wallichii W ght & Arn 81
Wallichii Hook f 82
Wightiana Wall 82
ILICINEÆ 81
Illicium 4

Pages
Ionidium 16
Ipomæa 223
Isonandra 211 212
caloneura Kurz 212
Gutta Hook 212
obovata Griff 212
polyandra Wight 215
polyantha Kurz 212
Wightiana DC 212
Itea 171
Chinensis Hook and Arn 172
macrophylla Wall 172
nutans Royle 171
Ixonanthes khasiana Hook f 58
IXORA 218 230
acuminata Roxb 230
Bandhuca Roxb 230
barbata Roxb 230
coccinea Linn 230
compactiflora Kurz 231
naucleiflora Kurz 231
parviflora Vahl 230 xxiii
Pavetta Roxb 230
polyantha Wight 230
recurva Kurz 231
stricta Roxb 230
tomentosa Roxb 231
undulata Roxb 230
villosa Roxb 230
weberæfolia Kurz 231
Ixoreæ 218

J

Jambosa Linn 191 193
Jasmineæ 254
JASMINUM 254 255
grandiflorum Linn 255
hirsutum Willd 255
officinale Linn 255
pubescens Roxb 255
revolutum Sims 255
Sambac Aiton 255
JATROPHA 347 364
Curcas Linn 364, xxix
364
364
364
Arg 364
144
144
391
392
39
39
393
39 xxx
391 411
411
411
411
41
41
411
k f
412
290
291
291
290

Pages

K

Kadsura 4
KANDELIA 175 176
Rheedii W and A 176
KAYEA 21 22
floribunda Wall 22
nervosa T And 22
stylosa Thw 22
Kendrickia 198
Kleinhovia 45
Hospita Linn 45
Kokoona littoralis Lawson 8
Kopsia 260
fruticosa DC 261
Kortlalsia 415 414
laciniosa Mast 414
scaphigera Mast 414
Kurrimia 83
paniculata Wall 83
pulcherrima Wall 83
robusta Kurz 83
KYDIA 42 43
calycina Roxb 43, vi
fraterna Roxb 43
glabrescens, Mast 43

L

LABIATÆ 300
LAGERSTROEMIA 200
calyculata Kurz 200
Flos Reginæ Retz 200
floribunda, Jack 200
grandiflora Roxb 201
hypoleuca, Kurz 203
indica, Linn 200
lanceolata Bedd 201
lanceolata Wall 201
macrocarpa Wall 203
microcarpa, Wight 201
parviflora Hook f 200 xxx
parviflora Roxb 201, xxi
pubescens Wall 201
Reginæ Roxb 202 xxi
tomentosa Presl 204
villosa Wall 200
Lagetta lintearia Lamk 315
Lanneum 68 69
anamallayanum Bedd 69
Lantana 281
alba Miller 282
dubia Roxb 282
Laportea 323
crenulata Gaudich 323
Lardizabaleæ 1
LARIX 294 409
europæa DC 409
Griffithii H f and Th 410
sibirica Ld 410
Lasianthus 219
Lasiosiphon 314
eriocephalus Dene 315
LAURACEÆ 294 313
Laurus 294
[illegible] Roxb
[illegible] Roxb
[illegible] Roxb
[illegible]
[illegible]
[illegible]

Pages.

Lawsonia . . . 200
alba, Lam. . . . 200
inermis, Linn. . . 200
Lebedieropsis . 347, 358
orbicularis, Müll. Arg. . . 358, xxix
Lecythea salicina, Lev. . 377
Lecythideæ . . . 187
Leea 93
aspera, Wall. . . 93
crispa, Willd. . . 92
gigantea, Griff. . . 93
hirta, Roxb. . . 93
macrophylla, Roxb. . 93
robusta, Roxb. . . 93
sambucina, Willd. 93, xv
sumatrana, Kurz . 94
Legnotideæ . . . 175
LEGUMINOSÆ . . 114
Lepidocaryineæ . . 415
Lepidostachys Roxburghii, Wall. 350
Lepionurus . . 80
oblongifolius, Mast. . 80
sylvestris, Kurz . . 80
Lepisanthes . . 93, 94
Leptadenia . . . 262
viminea, Bth. . . 265
Leptobœa . . . 274
multiflora . . . 274
Leptodermis - 218, 232
lanceolata, Wall. . . 232
Leptonychia . . . 45
Leptospermeæ . . 187
Lespedeza . . . 116
eriocarpa, DC. . . 119
Lettsomia . . . 273
Leucæna 145
glauca, Bth. . . 145
Leucomeris . . . 232
decora, Kurz . . 232
spectabilis, Don . . 232
Leucopogon malayanus, Jack. . . . 238
Leycesteria . . 213, 217
formosa, Wall. . . 217
Licuala . . . 415, 418
acutifida, Mast. . . 418
longipes, Griff. . . 418
paludosa, Griff. . . 418
peltata, Roxb. . . 418
Ligustrum . . 254, 258
bracteolatum, Don . 258
compactum, Hook. f. and Th. . . . 259
microphyllum, Bedd. . 258
nepalense, Wall. . . 258
robustum, Hook. f. and Th. 258
vulgare, Linn. . . 258
LILIACEÆ . . . 425
Limacia 11
Limonia 59
acidissima, Linn. . 59, x
crenulata, Roxb. . . 59
missionis, Wall. . . 62
Lindera 304
assamica, Kurz . . 304
heterophylla, Meissn. 304, xxvii
Neesiana, Kurz . . 304
LINEÆ 57

Linociera . . . 259
dichotoma, DC. . . xxv
intermedia, Wight . 259
macrophylla . . . 259
malabarica, Wall. . 259
Linostoma . . . 314
decandrum, Wall. . 315
pauciflorum, Griff. . 315
scandens, Kurz . . 315
siamense, Kurz . . 315
Linum usitatissimum . 58
Liquidambar orientale, Miller . . . 174
Liriodendron grandiflorum, Roxb. . . . 5
tulipiferum . . . 5
Litsæa . . . 304, 311
angustifolia . . . 304
consimilis, Nees . . 311
foliosa, Nees . . 311
lanuginosa, Nees . . 312
scrobiculata, Nees . 311
umbrosa, Nees . . 311
zeylanica, Nees . . 311
Litsæaceæ . . . 304
Livistona . . 415, 418
Jenkinsiana, Griff. 415, 418
speciosa, Kurz . . 418
LOGANIACEÆ . . 266
Lonicera . . 213, 216
alpigena, Linn. . . 217
angustifolia, Wall. . 217
glabrata, Wall. . . 216
hypoleuca, Dcne. . . 216
japonica, Thunb. . . 216
Leschenaultii, Wall. . 216
ligustrina, Wall. . . 216
Myrtillus, Hook. f. and Th. 216
orientalis, Lamarck . 216
Periclymenum, Linn. . 216
quinquelocularis, Hardwicke 216
spinosa, Jacquemont . 216
stipulata, Hook. f. and Th. 217
Lonicereæ . . . 213
Lophopetalum . 83, 85
fimbriatum, Wight . 85
floribundum, Wight . 85
littorale, Kurz . 85, 86
Wallichii, Kurz . . 86
Wightianum, Arn. . 86
LORANTHACEÆ . . 319
Loranthus . . . 319
amplexifolius, DC. . 319
bicolor, Roxb. . . 320
Candolleanus, W. & A. 319
capitellatus, W. and A. 319
cordifolius, Wall. . 319
farinosus, Desr. . . 319
globosus, Roxb. . . 319
ligustrinus, Wall. . 319
loniceroides, Linn. . 319
longiflorus, Desr. . 320
Neilgherrensis, W. and A. 319
obtusatus, Wall. . . 319
pulverulentus, Wall. . 319
tomentosus, Heyne . 319
umbellifer, Schultes . 319
vestitus, Wall. . . 320
viridiflorus, Wall. . 319

Loropetalum chinense, Oliv. 174
Luculia 218
gratissima, Sweet. . 218
Ludia spinosa, Roxb. . 17
Lumnitzera . . . 178
coccinea, W. and A. . 178
littorea, Voigt . . 179
racemosa, Willd. . . 178
Luvunga 59
Lycium 273
europæum, Linn. . 273
LYTHRARIEÆ . . 199
Lythreæ 199

M.

Maba 247
andamanica, Kurz 247, 253
buxifolia, Pers. . 247, xxv
merguiensis, Hiern . 247
micrantha, Hiern . 247
nigrescens, Dalz. and Gibs. 217
Macaranga . . 347, 362
andamanica, Kurz . 362
denticulata, Müll. Arg. 362, 363
flexuosa, R. Wight . 362
gummiflua, Müll. Arg. 362, 363
Helferi, Müll. Arg. . 362
indica, Wight . 362, 363
membranacea, Kurz . 362
minutiflora, Müll. Arg. 362
peltata, Müll. Arg. . 362
populifolia, Müll. Arg. 362
pudica 363
Tanarius, Müll. Arg. . 362
tomentosa, R. Wight 362, 363
Machilus . . 304, 308
fruticosa, Kurz . . 308
indica, Lour. . . 308
khasyana, Meissn. . 308
macrantha, Nees . . 308
odoratissima, Nees 308, xxvii
rimosa, Bl. . . . 308
tavoyana, Meissn. . 308
Macropanax . . 208, 210
oreophilum, Miq. . 210
undulatum, Seem. . 210
Maddenia . . . 161
himalaica, Hk. f. & Th. 161
pedicellata, Hook. f. . 161
Mæruа 14
arenaria, Hk. f. & Th. 14
Mæsa 268
argentea, Wall. . . 238
indica, A. DC. . 238, 239
macrophylla, Wall. . 239
montana, A. DC. . 239
paniculata, A. DC. . 239
ramentacea, Wall. . 239
Mæseæ 238
Magnolia . . . 4, 5
Campbellii, Hook. f. and Th. . . . 5, i
globosa, Hk. f. & Th. . 5
Griffithii, Hk. f. & Th. 5
sphenocarpa, Roxb. . 5

Pages

MAGNOLIACEÆ
Magnoliem
Malabathrum
Mala·ia
tortuosa Blanco
mu catus A u Arg
Roxburghianus A u Arg 360 361
stenanthus Müll Arg 360
tetracoccus Kurz 361
Tokbrai Müll Arg 360
MALPIGHIACEÆ 58
MALVACEÆ 41
MANGIFERA 103, 107
caloneura Kurz 107
fœtida Lour 107
indica Linn 107 xv
longipes Griff 107
oppositifolia Roxb 108
sylvatica Roxb 108 xv
Manglietia 4
Caveana, Hook f and Th 5
insignis Bl 5
Manihot 347
Glaziovii 348
utilissima, Pohl 348
Maoutia Puya Wedd 323
Mappa 80
fœtida, Miers 80
MARLEA 210 211
begoniæfolia Roxb 211
tomentosa, Endl 211
Marsdenia 6
lucida, Edgew 265
Roylei Wight 266
tenacissima, W & A 265
tinctoria R Br 26
Marsdeniem 2
Mastixia 211
arborea, Wight 211
Matudæa *lyneum*, Kurz 2
Medinilla 1
Medinilleæ 1
MELALEUCA 18 183
Cajuputi Roxb 183
Leucadendron Linn 1

Pages

199
199
198
45
68, 69
70
70
70
70
70
69
69
70
70
70
68
68
59
59
59
102
ht 10
103
10
10
Jungius va 10
suppliciifolia Roxb 103 xv
Wallichii Planch 103
Wightii Planch 103
Melocanna 426, 429
bambusoides Trin 429
humilis Kurz 429
Kurzii Munro 429
Melochia 45
velutina, Bedd 45
Melodinus 260 2 1
Melodorum 7
Memecylem 193
Memecylon 193
amabile Bedd. 19
edule Roxb 199 xxi
gracile Bedd 199
umbellatum Burm 199
MENISPERMACEÆ 11
Menispermum 11
Cocculus Roxb 11
cordifolium Willd 11
hirsutum Linn 11
laurifolium Roxb 1
polycarpon Roxb 11
MERIANDRA 300 301
bengalensis Bth 301
strobilifera Bth 301
Mespilus bengalensis, Roxb 16
japonica Banks 16
MESUA 21
coromandeliana, Wight
ferrea, Linn xv
Nagala
pulchella Pl. and Trian
Roxburghii Wight
sclerophylla Thw
speciosa Choisy

Pages

26
134
134
134
glabrum Desf 134
MICHELIA 4 5
Cathcartii, Hook f and Th 6
Champaca Linn. 6
excelsa, Blume 6
Kisopa Ham 5
lanuginosa Wall 7
nilagirica Zenk
oblonga, Wall 7
punduana Hook f and Th 5
Microdesmis 347
casearifolia Planch 348
Microglossa 292
volubilis DC.
Micromelum 59
hirsutum Oliv 59
pubescens Bl 59 xv
Micromelum 168
Microtropis 83
discolor Wall 83 xiv
MILIUSA
indica Lesch
macrocarpa Hook f and Th 9
nilagirica Bedd 9
Roxburghiana Hook f and Th 9
sclerocarpa Kurz 9
velutina Hook f and Th 8 9
Wightiana, Hk f & Th.
Miliusem 7
MILLETTIA 116 118
atropurpurea Bth 118
auriculata, Baker 118
Brandisiana, Kurz 118
cinerea Bth 118
leucantha Kurz 118
monticola Kurz 118
ovalifolia Kurz 118
pachycarpa Bth 118
pendula Bth 118
pubinervis Kurz 118
pulchra Bth. 118
tetraptera Kurz 118
MILLINGTONIA 103
hortensis Linn
Minusops elengi Roxb
MIMOSA 14 148
amara Roxb
arabica Roxb
bigeminata Roxb
cæsia Roxb
cinerea Roxb 148
concinna Roxb
dulcis Roxb
dumosa Roxb
eburnea Roxb
elata Roxb
Farnesiana Linn
ferruginea Roxb
Kalkora Roxb
hamata Willd 148
Kalkora Roxb
Lebbek Roxb 149

Pages.

LAWSONIA . . . 200
alba, Lam. . . . 200
inermis, Linn. . . 200
LEBEDIEROPSIS . 347, 358
orbicularis, Müll. Arg. . . 358, xxix
Lecythea salicina, Lev. . 377
Lecythideæ . . . 187
Leea 93
aspera, Wall. . . 93
crispa, Willd. . . 92
gigantea, Griff. . . 93
hirta, Roxb. . . 93
macrophylla, Roxb. . 93
robusta, Roxb. . . 93
sambucina, Willd. 93, xv
sumatrana, Kurz . 94
Legnotideæ . . . 175
LEGUMINOSÆ . . 114
Lepidocaryineæ . . 415
Lepidostachys Roxburghii, Wall. . . . 350
Lepionurus . . 80
oblongifolius, Mast. . 80
sylvestris, Kurz . . 80
Lepisanthes . . 93, 94
Leptadenia . . . 262
viminea, Bth. . . 265
LEPTOBŒA . . . 274
multiflora . . . 274
LEPTODERMIS . 218, 232
lanceolata, Wall. . . 232
Leptonychia . . . 45
Leptospermeæ . . . 187
Lespedeza . . . 116
eriocarpa, DC. . . 119
Lettsomia . . . 273
Leucæna . . . 145
glauca, Bth. . . 145
Leucomeris . . . 232
decora, Kurz . . 232
spectabilis, Don . . 232
Leucopogon malayanus, Jack. . . . 238
LEYCESTERIA . . 213, 217
formosa, Wall. . . 217
LICUALA . . . 415, 418
acutifida, Mast. . . 418
longipes, Griff. . . 418
paludosa, Griff. . . 418
peltata, Roxb. . . 418
LIGUSTRUM . . 254, 258
bracteolatum, Don . 258
compactum, Hook. f. and Th. . . . 259
microphyllum, Bedd. . 258
nepalense, Wall. . . 258
robustum, Hook. f. and Th. 258
vulgare, Linn. . . 258
LILIACEÆ . . . 425
Limacia 11
Limonia 59
acidissima, Linn. . 59, x
crenulata, Roxb. . . 59
missionis, Wall. . . 62
Lindera 304
assamica, Kurz . . 304
heterophylla, Meissn. 304, xxvii
Neesiana, Kurz . . 304
LINEÆ 57
LINOCIERA . . . 259
dichotoma, DC. . . xxv
intermedia, Wight . 259
macrophylla . . . 259
malabarica, Wall. . 259
Linostoma . . . 314
decandrum, Wall. . 315
pauciflorum, Griff. . 315
scandens, Kurz . . 315
siamense, Kurz . . 315
Linum usitatissimum . 58
Liquidambar orientale, Miller . . . 174
Liriodendron grandiflorum, Roxb. . . . 5
tulipiferum . . . 5
LITSÆA . . . 304, 311
angustifolia . . . 304
consimilis, Nees . . 311
foliosa, Nees . . 311
lanuginosa, Nees . . 312
scrobiculata, Nees . 311
umbrosa, Nees . . 311
zeylanica, Nees . . 311
Litsæaceæ . . . 304
LIVISTONA . . 415, 418
Jenkinsiana, Griff. 415, 418
speciosa, Kurz . . 418
LOGANIACEÆ . . 266
LONICERA . . 213, 216
alpigena, Linn. . . 217
angustifolia, Wall. . 217
glabrata, Wall. . . 216
hypoleuca, Dcne. . . 216
japonica, Thunb. . . 216
Leschenaultii, Wall. . 216
ligustrina, Wall. . . 216
Myrtillus, Hook. f. and Th. 216
orientalis, Lamarck . 216
Periclymenum, Linn. . 216
quinquelocularis, Hardwicke . . . 216
spinosa, Jacquemont . 216
stipulata, Hook. f. and Th. 217
Loniceræ . . . 213
LOPHOPETALUM . 83, 85
fimbriatum, Wight . 85
floribundum, Wight . 85
littorale, Kurz . 85, 86
Wallichii, Kurz . . 86
Wightianum, Arn. . 86
LORANTHACEÆ . . 319
LORANTHUS . . . 319
amplexifolius, DC. . 319
bicolor, Roxb. . . 320
Candolleanus, W. & A. 319
capitellatus, W. and A. 319
cordifolius, Wall. . 319
farinosus, Desr. . . 319
globosus, Roxb. . . 319
ligustrinus, Wall. . 319
loniceroides, Linn. . 319
longiflorus, Desr. . 320
Neilgherrensis, W. and A. 319
obtusatus, Wall. . . 319
pulverulentus, Wall. . 319
tomentosus, Heyne . 319
umbellifer, Schultes . 319
vestitus, Wall. . . 320
viridiflorus, Wall. . 319
Loropetalum chinense, Oliv. 174
Luculia 218
gratissima, Sweet. . 218
Ludia spinosa, Roxb. . 17
Lumnitzera . . . 178
coccinea, W. and A. . 178
littorea, Voigt . . 179
racemosa, Willd. . . 178
Luvunga 59
Lycium 273
europæum, Linn. . . 273
LYTHRARIEÆ . . 199
Lythreæ 199

M.

Maba 247
andamanica, Kurz 247, 253
buxifolia, Pers. . 247, xxv
merguiensis, Hiern . 247
micrantha, Hiern . 247
nigrescens, Dalz. and Gibs. 247
MACARANGA . . 347, 362
andamanica, Kurz . 362
denticulata, Müll. Arg. 362, 363
flexuosa, R. Wight . 362
gummiflua, Müll. Arg. 362, 363
Helferi, Müll. Arg. . 362
indica, Wight . 362, 363
membranacea, Kurz . 362
minutiflora, Müll. Arg. 362
peltata. Müll. Arg. . 362
populifolia, Müll. Arg. 362
pudica 363
Tanarius, Müll. Arg. . 362
tomentosa, R. Wight 362, 363
MACHILUS . . 304, 308
fruticosa, Kurz . . 308
indica, Lour. . . 308
khasyana, Meissn. . 308
macrantha, Nees . . 308
odoratissima, Nees 308, xxvii
rimosa, Bl. . . . 308
tavoyana, Meissn. . 308
MACROPANAX . . 208, 210
oreophilum, Miq. . 210
undulatum, Seem. . 210
Maddenia . . . 161
himalaica, Hk. f. & Th. 161
pedicellata, Hook. f. . 161
Mærua 14
arenaria, Hk. f. & Th. 14
MÆSA 268
argentea, Wall. . . 238
indica, A. DC. . 238, 239
macrophylla, Wall. . 239
montana, A. DC. . 239
paniculata, A. DC. . 239
ramentacea, Wall. . 239
Mæseæ 238
MAGNOLIA . . . 4, 5
Campbellii, Hook. f. and Th. . . . 5, i
globosa, Hk. f. & Th. . 5
Griffithii, Hk. f. & Th. 5
sphenocarpa, Roxb. . 5

MAGNOLIACEÆ 4
Magnolieæ
Malabathrum 30
Malaisia 32
tortuosa Blanco 32
Mallea Pothii Adr Juss 69
MALLOTUS 347 360
acuminatus Müll Arg 360
albus Mull Arg 360 361
atrovirens Müll Arg 360
aureo punctatus Müll Arg 360
barbatus Müll Arg 360
decipiens Müll Arg 360
distans Müll Arg 360
[illegible]
Arg 360
ricinoides Müll Arg 360
Roxburghianus Müll Arg 360 361
stenanthus Müll Arg 360
tetracoccus Kurz 361
Tokbra Müll Arg 360
MALPIGHIACEÆ 58
MALVACEÆ 41
MANGIFERA 103, 107
caloneura Kurz 107
fœtida Lour 107
indica Linn 107 xv
longipes Griff 107
oppositifolia Roxb 108
sylvatica Roxb 108 xv
Manglietia 4
Caveana, Hook f and Th 5
insignis Bl 5
Manihot 347
Glaziovii 348
utilissima, Pohl 348
Maoutia Puya Wedd 323
Mappa 80
fœtida Miers 80
MARLEA 210 211
begoniæfolia Roxb 211
tomentosa, Endl 211
Marsdenia [illegible]
lucida, Edgew [illegible]
Roylei Wight 266
tenacissima W & A [illegible]
tinctoria R Br [illegible]
Marsileaceæ [illegible]
Mastixia 210
arborea Wight 211
M[illegible]yodendron [illegible], Kurz [illegible]
Medinilla [illegible]
Melin[illegible] [illegible]
MELALEUCA 187, 188
Cajuputi Roxb 188
Leucadendron, Linn 188

[illegible]
patens Mull Arg 347
MELASTOMA 198 199
malabathricum, Linn 199
MELASTOMACEÆ 198
Melhania 45
MELIA 68, 69
Azadirachta, Linn 70
Azedarach Linn 70
birmanica Kurz 70
composita Willd 70
dubia Cav 70
[illegible] 69
69
70
70
70
68
68
59
59
59
10[illegible]
102
103
[illegible] 102
pungens Bedd 102
pungens Wall 102
semplicifolia Roxb 103 xv
Wallichii Planch 103
Wightii Planch 103
Melocanna 426, 429
bambusoides Trin 429
humilis Kurz 429
Kurzii Munro 429
Melochia 45
velutina, Bedd 45
Melodinus 260 261
Melodorum 7
Memecylem 198
Memecylon 198
amabile Bedd 199
edule Roxb 199 xxi
gracile Bedd 199
umbellatum Burm 199
MENISPERMACEÆ 11
Menispermum 11
Cocculus Roxb 11
cordifolium Willd 11
hirsutum Linn 11
laurifolium Roxb 12
polycarpon Roxb 11
MERIANDRA 300 301
bengalensis Bth 301
strobilifera Bth 301
Mespilus bengalensis, Roxb 16[illegible]
japonica Banks 16[illegible]
MESUA 21 23 27
coromandeliana, Wight [illegible]
ferrea, Linn [illegible] xv
Nagaha [illegible]
pulchella Pl. and Trian [illegible]
[illegible], Wight [illegible]
sclerophylla, Thw [illegible]
speciosa Choisy [illegible]

[illegible] 26
[illegible] 134
[illegible] 134
[illegible] 134
glabrum Desf 134
MICHELIA 4 5
Cathcartii, Hook f and Th 6
Champaca Linn 6
excelsa, Blume 6
Kisopa Ham 5
lanuginosa Wall 7
nilagirica Zenk 6
oblonga, Wall. 7
punduana Hook f and Th 5
Microdesmis 347
caseariæfolia, Planch 348
Microglossa 232
volubilis DC. 232
Micromelum 59
hirsutum Oliv 59
pubescens Bl 59 xv
Micromelus 10[illegible]
Microtropis 83
discolor Wall 83 xiv
MILIUSA 7 9
indica Lesch 9
macrocarpa Hook f and Th 9
nilagirica Bedd 9
Roxburghiana Hook f and Th 9
sclerocarpa Kurz 9
velutina Hook f and Th 8 9
Wightiana, Hk f & Th. 9
Miliuseæ 7
MILLETTIA 116 118
atropurpurea Bth 118
auriculata, Baker 118
Brandisiana, Kurz 118
cinerea Bth 118
leucantha Kurz 119
monticola Kurz 118
ovalifolia Kurz 119
pachycarpa Bth 118
pendula Bth 118
pulchrinervis Kurz 118
pulchra Bth 118
tetraptera, Kurz 118
MILLINGTONIA 103 274
hortensis, Linn 274
Milnea edulis Roxb 69
MIMOSA 14[illegible] 148
amara Roxb [illegible]
arabica, Roxb [illegible]
bigemina Roxb [illegible]
cæsia Roxb [illegible]
cinerea Roxb 148
concinna Roxb [illegible]
dulcis Roxb [illegible]
d[illegible] Roxb [illegible]
eburnea Roxb [illegible]
elata Roxb [illegible]
[illegible] Linn [illegible]
ferruginea Roxb [illegible]
heterophylla Roxb [illegible]
hamata Willd [illegible]
hexandra Roxb [illegible]
[illegible], Roxb [illegible]

Pages.

calocarpus, Kurz . 350
canaranus, Müll. Arg. 350
coccineus, Müll. Arg. 350
columnaris, Müll. Arg. 351
cyanospermus, Müll. Arg. 351
Daltoni, Müll. Arg. . 351
dasystylus, Kurz . . 351
distichus, Müll. Arg. . 351
Emblica, Linn. 351, xxviii
fagifolius, Müll. Arg. . 350
glaucifolius, Müll. Arg. 351
Helferi, Müll. Arg. . 350
Heyneanus, Müll. Arg. 351
Hohenackeri, Müll. Arg. 350
indicus, Müll. Arg. . 351
juniperinoides, Müll. Arg. 351
khasicus, Müll. Arg. . 351
lanceolarius, Müll. Arg. 350, xxviii
leiostylus, Kurz . . 351
Leucopyrus, Roxb. . 354
longifolius, Roxb. . 351
macrocarpus, Kurz . 351
malabaricus, Müll. Arg. 351
multiflorus, Roxb. . 353
multilocularis, Müll. Arg. 350
neilgherrensis, Müll. Arg. 351
nepalensis, Müll. Arg. . 350
nitidus, Müll. Arg. . 350
patens, Roxb. . . 347
Perottetianus, Müll. Arg. 351
polyphyllus, Willd. . 351
reclinatus, Roxb. . 347
reticulatus, Müll. Arg. 351
retusus, Roxb. . . 354
sphærogynus, Müll. Arg. 351
stellatus, Retz . . 351
subscandens, Müll. Arg. 350
sylheticus, Müll. Arg. . 351
Thomsoni, Müll. Arg. 351, 352
tomentosus, Müll. Arg. 350
velutinus, Müll. Arg. . 351
virosus, Roxb. . . 354
Vitis idæa, Roxb. . 347
zeylanicus, Müll. Arg. . 350
Phyllochlamys spinosa, Bureau . . . 323
Phyllostachys . . 426, 427
bambusoides, Sieb. and Zucc. 427
Phytocrene . . . 80
gigantea, Wall. . . 80
Phytocreneæ . . . 80
Picramnieæ . . . 63
Picrasma . . . 64
javanica, Bl. . . 64
nepalensis, Benn. . 64
quassioides, Benn. . 64
Pierardia sapida, Roxb. . 354
Pieris . . . 234, 235
formosa, Don . . 235
lanceolata, Don . . 235
ovalifolia, Don . . 235
Pileostegia . . . 171
viburnoides, Hook. f. and Th. . . . 171
Pimenta officinalis, Ldl. . 188
Pinanga gracilis, Kurz . 428
Pinus . . . 394, 395
Brunoniana, Wall. . 398
Cembra, Linn. . . 396
Deodara, Roxb. . . 400
excelsa, Wall. . 396, 398
Gerardiana, Wall. . 396
halepensis, Müll. . . 396
Khasya, Royle . 396, 397
Laricio, Poiret . . 396
longifolia, Roxb. . . 396
maritima, Lamk. . 396
Merkusii, Jungh. . 396, 398
Pinaster, Soland. . . 396
Pinea, Linn. . . 396
Strobus, Linn. . . 396
sylvestris, Linn. . . 396
Piptadenia . . 145, 146
oudhensis, Brandis . 146
Piptanthus . . . 116
nepalensis, D. Don . 116
Pisonia 302
aculeata, Linn. 302, xxvi
alba, Span. . . . 302
umbellifera, Seem. . 302
Pistacia . . . 103, 106
integerrima, J.L. Stewart 106
Lentiscus, Linn. . . 106
Terebinthus, Linn. . 106
vera, Linn. . . . 106
Pithecolobium . . . 145
anamallayanum, Bedd. 145
angulatum, Bth. . . 145
bigeminum, Martins . 145
dulce, Bth. . . . 145
Saman 145
PITTOSPOREÆ . . 19
Pittosporum, Hook. fil. . 19
dasycaulon, Miq. . . 19
eriocarpum, Royle . 19
ferrugineum, Ait. . 19
floribundum, W. & A. . 19
glabratum, Ldl. . . 19
humile, Hook. f. & Th. 19
nilghirense, W. & A. . 19
tetraspermum, W. & A. 19
Plagiopteron . . 51, 52
fragrans, Griff. . . 52
Planchonia . . 187, 197
littoralis, Van Houtte . 198
valida, Blume . . 198
PLATANEÆ . . . 345
Platanus . . . 345
occidentalis, Linn. . 345
orientalis, Linn. . . 345
Plecospermum . 323, 327
spinosum, Trecul. 327, xxvii
Plectocomia . . 415, 424
assamica, Griff. . . 424
himalayana, Griff. . 424
khasyana, Griff. . . 424
macrostachya . . 424
Plectranthus . . . 300
rugosus, Wall. . . 300
Plectronia . . 218, 230
didyma, Bth. and Hook. f. . . . 230, xxiii
parviflora, Roxb. . . 230
Plerandreæ . . . 208
Pleurostylia . . . 83
Wightii, W. and A. . . 83
Pluchea 232
indica, Less. . . 232
PLUMBAGINEÆ . . 238
Plumeria 260
acutifolia, Poiret . . 260
Polalyrieæ . . . 116
Podocarpus . . 394, 414
bracteata, Bl. . . 414
latifolia, Wall. . . 414
neriifolia, Don . . 414
Pœciloneuron . . . 21
indicum, Beddome . 21
pauciflorum, Beddome. 21
Poinciana . . . 134
elata, Linn. . . . 134
regia, Bojer . . . 134
Poinsettia pulcherrima . 368
Polyalthia . . . 70
cerasoides, Bth. and Hook. f. . . . 9, i
coffeoides, Bth. and Hook. f. . . . 8
Jenkinsii, Bth. and Hook. f. . . 8, 10
longifolia, Bth. and Hook. f. . . . 8
simiarum, Bth. and Hook. f. . . . 8
suberosa, Bth. and Hook. f. . . . 8
POLYGALEÆ . . 19
Polygala arillata, Ham. 19, iii
Karensium, Kurz . 19
POLYGONEÆ . . 303
Polygonum . . . 303
molle, Don . . . 303
Polyosma . . 171, 172
integrifolia, Bl. . . 172
Wallichii, Bennett . 172
Polyphragmon flavescens 219
Polyscias 208
Pomeæ 161
Pometia . . . 93, 98
eximia, Beddome . 98
tomentosa, Bth. . . 98
Pongamia . . 116, 132
glabra, Vent. . 133, xvii
Popowia 7
Beddomeana, Hook. f. and Th. . . . 8
Helferi, Hook. f. & Th. 8
ramosissima, Hook. f. and Th. . . . 8
Populus 378
alba, Linn. . . . 378
balsamifera, Linn. . 379
ciliata, Wall. . . 379
euphratica, Olivier . 378
nigra, Linn. . . . 378
tremula, Linn. . 378, 379
Porana 273
Posoqueria dumetorum, Willd. . . . 227
fragrans, Kön. . . 226
uliginosa, Roxb. . . 226
Potentilla . . . 161
frutescens . . . 161
fruticosa, Linn. . . 161
Salessovii, Steph. . 161
Potentilleæ . . . 161
Pottsia . . . 260, 261
Pourthiæa . . . 162
arguta, Dcne. . . 162

Pages
POUZOLZIA 323, 325
viminea, Wedd 325
PREMNA 281, 293
barbata Wall 293
interrupta Wall 293
integrifolia, Linn. 295
latifolia Roxb 294 xxvii
longifolia Roxb 294
mucronata Roxb 295
sambucina, Wall 293
scandens Roxb 293
serratifolia Linn 295
tomentosa Willd 294
viburnoides 293
PRINSEPIA 161 164
utilis Royle
Priotropis
cytisoides, W & A
Prismatomeris tetrand
Hook f and Th
PROSOPIS 1
glandulosa Torr
juliflora DC
pallida Kunth
pubescens Bth
spicigera, Linn
Stephaniana Kunth 146
PROTEACEÆ 318
Protium 66
caudatum W and A 66
pubescens W and A 66
Prunea 161
PRUNUS 161, 162
acuminata Wall 164
Amygdalus Baillon 162
armeniaca Linn 162
[illegible]
Paddum Roxb 163
punctata, Hook f and Th 162
prostrata Labill. 162
rufa Wall 162
tomentosa Thunb 162
Pseudostachyum 429
compactiflorum, Kurz 429
Helferi Kurz 429
polymorphum Munro 429
Pseudostreblus indica 323
PSIDIUM 157, 190
Guava Raddi 190
pomiferum Willd 190
pyriferum, Willd 190
Psychotria 218 219
Psychotriea 218
Pteris aquilina Linn 4[illegible]
Pternandra 1[illegible]8
PTEROCARPUS 116, 130
dalbergioides Roxb 130
erinaceus Poir 130
indicus Willd 130
macrocarpus, Kurz 130

Pages
Marsupium Roxb 116, 138, xvii
santalinus Linn f 131
Pterolobium 134
indicum A Rich 134
macropterum Kurz 134
PTEROSPERMUM 45 49
acerifolium Willd 49 vii
canescens Roxb 50
cinnamomeum Kurz 49
diversifolium Bl 49
glabrescens W and A 49
Heyneanum Wall 49
[illegible]
acuminatum Colebr 164
Andersoni, Hook f 164
arboreum Endl 164
ceylanicum Bedd 164
Gardneri, Hook f 164
glaberrimum Hook f 164
montanum Hook f 164
Wightianum Bl 164
zeylanicum Gaertn 164
Pyrenaria 27, 28
[illegible] 28
[illegible] 28
[illegible] 28
[illegible] 28
[illegible] 28
[illegible] 320
[illegible] 320
[illegible] 320
[illegible] 168
Aria Ehrh. 169
Aucuparia Gaertn 168
baccata Linn 168
communis Linn 168
cuspidata Bertol 168
Cydonia Linn 161
ferruginea Hook f 168
foliolosa Gaertn 168
[illegible] Wall 169
germanica, Lill 169
granulosa Bertol 168
Griffithii, Dene 168
indica Wall 161
insignis, Hook f 168
Jacquemontiana, Dene 168
khasyana, Dene 168
Kumaoni Dene 168
lanata, Don 169
Malus, Linn. 168
microphylla Wall 169
Pashia Ham 168
polycarpa Hook f 168
rhamnoides Dene 168 xx
sikkimensis Hook f 168
Thomsoni, King 168

Pages
ursina, Wall 169
variolosa Wall 168
vestita Wall 169
Wallichii Hook f 168, xx

Q.

Quassia amara 63
QUERCUS 3[illegible]
acuminata, Roxb 380, 38[illegible], xxix
Ægilops Linn 381
Amherstiana Wall 380
annulata Sm 381 xxx
ar[illegible]ata Roxb 380
Ballota Desf 383
Baloot Griff 383
brancana Schiff 381
Brandisiana Kurz 381
dealbata Hook f & Th 380
dilatata, Lindl 380 383 xxix
eumorpha, Kurz 381
Falconeri Kurz 380
fenestrata Roxb 380
ferox Roxb 380
Griffithii Hook f and Th 38[illegible] 381
Ilex Linn 380 383
incana Roxb 380 384
lamellata, Roxb 381 387
lamellosa Sm 387
lanata Wall 384
lanceafolia Roxb 381 388
lanuginosa, Don 380 384
lappacea Roxb 380 38[illegible]
mespilifolia Wall 381
mixta Alph DC 380
occidentalis Gay 381
Olla Kurz 381
oxyodon Miq 380
pachyphylla Kurz 380, 38[illegible], xxx
paucilamellosa Alph DC 387
pedunculata Ehrh 381
[illegible]ullata Don 387
polyantha Lill 384
Robur Linn 381
semecarpifolia Sm 380, 382
semiserrata, Roxb 380
serrata Roxb [illegible]
serrata Thunb 380, 384
sessiliflora, Sm. 381
[illegible]cata Sm [illegible]
squamata Roxb [illegible]
Suber Linn 381
Thomsoni Miq 383
Thomsoniana, Alph DC 381
turbinata Roxb 38[illegible]
velutina Linn 380
xylocarpa, Kurz [illegible]
Quisqualis 178 179
indica Roxb 179

R.

Radermachera amœna, Seem 277

Pages.
RANDIA . . . 218, 226
dekkanensis, Bedd. . 226
dumetorum, Lam. { 227 xxiii
fragrans, Bedd. . . 226
Gardneri, Thw. . . 226
nutans, DC. . . 226
racemosa, Roxb. . . 218
rigida, DC. 226, xxiii
speciosa, Bedd. . . 226
stricta, Roxb. . . 219
tetrasperma, Bth. and Hook. f. . . . 227
uliginosa, DC. 226, xxiii
RANUNCULACEÆ . 1
Raphistemma . . 265
pulchellum, Wall. . 265
Rauwolfia . . . 260
densiflora, Bth. . . 261
serpentina, Bth. . . 261
Ravenala madagascariensis, Sonn. . . 415
Reevesia . . . 45
Reinwardtia . . . 57
pubescens, Mast. . 45
Wallichii, Br. . . 45
REPTONIA . . 238, 241
buxifolia, A. DC. . 241
Retiniphylleæ . . 218
Rhabdia . . . 269
viminea, Dalzell . 269, xxvi
RHAMNEÆ . . . 88
RHAMNUS . . 88, 91
catharticus, Linn. . 91
dahuricus, Pall. . . 91
hirsutus, W. and A. . 91
nepalensis, Wall. 91, xiv
persicus, Boissier . 91
procumbens, Edgew. . 92
purpureus, Edgew. . 92
triquetrus, Wall. . 92
virgatus, Roxb. 91, 92
Wightii, W. and A. . 91
Rhazya 260
stricta, Decaisne . 261
RHIZOPHORA . 175, 176
conjugata, Linn. . 176
decandra . . . 176
gymnorhiza, Roxb. . 177
Mangle, Roxb. . . 176
mucronata, Lamk. . 176
RHIZOPHOREÆ . . 175
Rhodamnia . . 187, 188
trinervia, Bl. . . 188
RHODODENDRON . 234, 235
Anthopogon, Don . 235
arboreum, Sm. . . 236
argenteum, Hook. f. . 236
barbatum, Wall. . . 237
campanulatum, Don . 237
Campbelliæ, Hook. f. . 236
cinnabarinum, Hook. f. 238
Dalhousiæ, Hook. f. . 235
Edgeworthii, Hook. f. . 235
Falconeri, Hook. f. 236, 237
formosum, Wall. . . 236
fulgens, Hook. . . 237
Hodgsoni, Hook. . . 236
lepidotum, Wall. . . 236
moulmeinense, Hook. . 236
nivale, Hook. . . 236
puniceum, Roxb. . . 236
setosum, Don . . 236
Rhodomyrtus . . . 187
tomentosa, DC. . . 187
Rhodoreæ . . . 234
Rhopala excelsa, Roxb. . 318
moluccana, Roxb. . 318
RHUS . . . 103, 104
acuminata, DC. . . 106
buckiamela, Roxb. . 105
Coriaria, Linn. . . 104
Cotinus, Linn. . . 104
Griffithii, Hook. f. . 104
insignis, Hook. f. . 105
javanica, Linn. . . 105
khasiana, Hook. f. . 104
mysorensis, Heyne . 104
paniculata, Wall. . 104
parviflora, Roxb. . . 104
punjabensis, J. L. Stewart . . . 105
semialata, Murray . 105
succedanea, Linn. . 106
vernicifera, DC. . . 105
Wallichii, Hook. f. . 106
RIBES . . . 171, 173
desmocarpum, Hook. f. and Th. . . . 171
glaciale, Wall. . . 173
Griffithii, Hk. f. & Th. 173
Grossularia, Linn. . 173
luridum, Hk. f. & Th. . 173
nigrum, Linn. . . 13
orientale, Poiret . . 173
rubrum, Linn. . . 173
Ribesieæ 171
RICINUS . . . 347, 363
communis, Linn. . . 363
dicoccus, Roxb. . . 360
Rivea 273
Robinia macrophylla, Roxb. . . . 118
RODETIA 302
amherstiana, Miq. . 302
Rondeletia exserta, Roxb. 225
tinctoria, Roxb. . . 225
Rondeletieæ . . . 218
ROSA . . . 161, 166
anserinifolia, Boiss. . 166
Eglanteria, Linn. . 166
involucrata, Roxb. . 166
Leschenaultiana, W. and A. . . . 166
longicuspis, Bertol. . 166
lutea, Mill. . . . 166
macrophylla, Lindl. . 167
moschata, Mill. . . 166
sericea, Lindl. . . 167
Webbiana, Wall. . . 166
ROSACEÆ . . . 161
Roseæ 161
Rottlera alba, Roxb. . 361
dicocca, Roxb. . . 360
peltata, Roxb. . . 361
tetracocca, Roxb. . 361
tinctoria, Roxb. . . 361
Rourea 114
santaloides, Vahl . 114
Roydsia 14
obtusifolia, Hook. f. and Th. . . . 14
suaveolens, Roxb. . 14
ROYLEA . . . 300, 301
elegans, Wall. . . 301
Rubeæ 161
RUBIACEÆ . . . 217
Rubia cordifolia, Linn. . 219
RUBUS . . . 161, 165
biflorus, Buch. . . 165
ellipticus, Smith . . 166
flavus, Ham. . . 166
fruticosus, Linn. . . 165
Gowreephul, Roxb. . 166
lasiocarpus, Smith . 166
lineatus, Reinw. . . { 166 xix
moluccanus, Linn. . 165
niveus, Wall. . . 165
paniculatus, Sm. . 165, xix
racemosus, Roxb. . 165
rosæfolius, Sm. . . 165
sikkimensis, O. Kze. . 165
Ruellieæ 280
RUMEX 303
hastatus, Don . . 303
RUTACEÆ . . . 59
Ruteæ 59

S.

SABIACEÆ . . 102, 103
Sabia 102
campanulata, Wall. . 102
leptandra, Hook. f. and Th. . . . 102
paniculata, Edgew. . 102
Saccharum . . . 426
cylindricum, L. . . 426
spontaneum, L. . . 426
SACCOPETALUM . . 10
longiflorum, Hook. f. and Th. . . . 10
tomentosum, Hook. f. and Th. . . 10, i
SAGERETIA . . . 88, 92
Brandrethiana, Aitch. 92
oppositifolia, Brongn. . 92
theezans, Brongn. . 92
Saguerus Rumphii, Roxb. 421
Salacia 83
SALICINEÆ . . . 374
Salisburia adiantifolia . 374
SALIX . . . .
acmophylla, Boiss. . 374
alba, Linn. . 374, 375
angustifolia, Willd. . 375
babylonica, Linn. 374, 376
calostachya, And. . 374
calyculata, Hook. f. . 375
Caprea, Linn. . 374, 375
Daltoniana, And. . 375
daphnoides, Vill. . 375, 377
divergens, And. . . 375
elegans, Wall. . 375, 377
eriophylla, And. . . 375
eriostachya, Wall. . 375
flabellaris, And. . . 375
fragilis, Linn. . . 374
hastata, Linn. 375, 376
insignis, And. . . 375
Lindleyana, Wall. . 375
longiflora, Wall. . . 375
obscura, And. . . 375
oreophila, Hook. f. . 375
oxycarpa, And. . . 374
populifolia, And. . . 375
pycnostachya, And. . 371

Pages
pyrina Wall 375
sclerophylla And 375
Serpyllum And 375 xxix
sikkimensis And 375
tetrasperma Roxb 374, 375, xxix
Thomsonana And. 375
urophylla Ldl 374
viminalis Linn 375 377
Wallichiana And 374 376
SALVADORACEÆ 259
SALVADORA 259
oleoides Linn 260
persica Linn 259
Wight ana Beddome 259
SAMADERA 63 64
indica Gaertn 64
SAMARA 238 240
floribunda Bth and
Hook f 240
Sambuceæ 213
SAMBUCUS 213
adnata Wall 213
Ebulus Linn 213
javanica Reinw 213
Thunbergiana Bl 213
SAMYDACEÆ 205
SANDORICUM 68 72
indicum Cav 72
Sansevera zeylanica Willd 495
SANTALACEÆ 320
SANTALUM 321
album Linn 321
SAPINDACEÆ 93
Sapindeæ 93
SAPINDUS 93 96
attenuatus Wall 97 xv
Danura Voigt 96 xv
detergens Roxb 96
emarginatus Vahl 96
Mukorossi Gaertn 9
ruber Kurz
rubiginosa Ball
squamosus Roxb
trifoliatus Linn
Sapium baccatum Roxb
indicum Roxb
sebiferum Roxb
SAPOTACEÆ
Saprosma 218
SARACA 134 144
indica Linn 144
Lobbiana, Baker 144
Hookeriana Baill 371
saligna Mull Arg 371

Pages
SARCOSPERMA 241 242
arborea Hook 242
Griffithii Hook 242
Sarcostigma 81
Sassafras 304
officinale Nees 313
Satureineæ
SAURAUJA
fasciculata, Wall
Griffithii Dyer
napaulensis DC
punduana Wall
Roxburghii Wall 29 iv
tristyla DC 29
Saurauieæ 27
Sauropus 347
albicans Bl 347
SAXIFRAGEÆ 171
Scævola Koenigii Vahl 233
Taccada, Roxb 233
27 29
29
29
29
29
30
Wa clii, Choisy 29
Schizandra 4
grandiflora Hook f and Th 4
Schizandreæ 4
SCHLEICHERA 93 95
pentapetala Roxb 94
trijuga Willd 95 xv
Schnidelia Cobbe Beddome 94
Schöpfia 80
acuminata Wall 80
fragrans Wall 80
SCHREBERA 254 255
swietenioides Roxb 255
SCOLOPIA 16 17
crenata Clos 17
rhinanthera Clos 17
Roxburghii Clos 17
Scopolia aculeata Sm 61
SCROPHULARINEÆ 273
Scutia 88
indica Brongn 88
Securidaca 19
appendiculata Hassk 19
tavoyana Wall 19
Grahami Wight
travancorica Bedd 111

Pages
Senna arborescens Roxb 130
s matrana Roxb 1 8
Sequoia 394
gigantea Torrey 394
sempervirens Endl 394
Serissa 219
assamica Dyer 31 vi
floribunda, Kurz 34
grattissima Dyer 34
Helferi Kurz 34
laccifera Heyne 34
obtusa W ll 30
robusta Gaertn 31 v
siamensis Miq 30
stellata Dyer 34
Talura Roxb 34
Tumbuggaia Roxb 30
Sideroxylon 241
arboreum Ham 242
elengioides Bth and Hook f 241
tomentosum Roxb 241, xxv
SIMARUBEÆ 63
Siphonanthus 299
Siphonodon 83
celastrineus Griff 83
indica Linn 299
Sissoo 1 4
SKIMMIA 59 61
Laureola Hook f 61 ix
Smythea 83
SOLANEÆ 273
Solanum 274
verbascifolium Linn. 273
Solenocarpus 103, 104
indica W and A 104
SONNERATIA 2
acida, Linn 205 xxi
alba Sm 206
apetala Buch 205
Griffithii Kurz 205
Sophora 116
mollis Wall 116
Sophoreæ 116
Sorbus 1 8
SOYMIDA 68 7
febrifuga Adr Juss 7 xi
Spathodea amœna W. DC
arcuata Wight 276
crispa Wall 276
falcata Seem. 276
Rheedii Seem 276
Roxburghii Sprengel 277
stipulata Wall.
xylocarpa T And.
Spathol us
Roxburghii
Sphenodesma 281
unguiculata, Schauer
Wallichiana, Schauer
SPIRÆA 161
canescens Don
Lindleyana DC
sorbifolia Linn
Spiræeæ 161

Pages.
SPONDIAS . . 103, 112
acuminata, Roxb. . 112
axillaris, Roxb. . . 112
mangifera, Pers. . { 113, xvi
Spondieæ . . . 103
SPONIA . . . 323, 344
amboinensis, Dcne. . 344
orientalis, Planch. { 344, 345, xxviii
politoria, Planch. . 345
velutina, Planch. . 344
Wightii, Planch. . . 344
Stachydeæ . . . 300
Stachyurus . . 27, 28
himalaicus, Hook. f. and Th. . . . 28
STAPHYLEA . . 93, 101
Emodi, Wall. . . 101
Staphyleæ . . . 93
Stemonurus . . . 80
Stephania . . . 11
STEPHEGYNE . . 217, 222
diversifolia, Hook. f. and Bth. . . . 222
parvifolia, Hook. f. and Bth. . . 222, xxiii
tubulosa, Hook. f. and Bth. 222
STERCULIA . . . 45
alata, Roxb. . . 45
angustifolia, Roxb. . 45
Balanghas, Linn. . . 45
coccinea, Roxb. . . 47
colorata, Roxb. . 47, vii
fœtida, Linn. . . 45
guttata, W. and A. . 45
lanceæfolia, Roxb. . 45
Roxburghii, Wall. . 45
urens, Roxb. . 46, vii
villosa, Roxb. . 46, vii
STERCULIACEÆ . . 45
Sterculieæ . . . 45
STEREOSPERMUM . 274, 277
amœnum, Benth. and Hook. f. . . . 277
chelonoides, DC. 278, xxvi
fimbriatum, DC. . . 279
neuranthum, Kurz . 277
suaveolens, DC. . { 278, xxvi, xxx
xylocarpum, Bth. and Hook. f. . . . 279
Stilago diandra, Roxb. . 350
STRANVÆSIA . . 161, 170
glaucescens, Lindl. . 170
Stravadium acutangulum 196
Strebleae . . . 323
STREBLUS . 323, 324, 326
asper, Lour. . . 326
Streptocaulon . . 265
extensum, Wight . 265
tomentosum, Wight . 265
Strobilanthes . . 280
fimbriata, Nees . . 280
flaccidifolius, Nees . 280
flaccidus . . . 280
flava, Kurz . . . 280
lamioides, T. And. . 280
Neesii, Kurz . . 280
Simonsii, T. And. . 280
Strombosia . . . 80
ceylanica, Gordon . 80
javanica, Bl. . . 80
Strophanthus . 260, 261
STRYCHNOS . . 266, 268
acuminata, Wall. . 268
cinnamomifolia, Thw. . 268
colubrina, Linn. . . 268
laurina, Wall. . . 268
Nux-vomica, Linn. { 269, xxiv
potatorum, Linn. 268, xxvi
Wallichiana, Steud. . 268
Stylocoryne Webera, A. Rich. . . . 226
STYRACEÆ . . . 253
Styrax . . . 253
Benzoin . . . 253
officinale . . . 253
rugosum, Kurz . . 253
serrulatum, Roxb. 253, xxv
virgatum, Wall. . . 253
Sumbavia . . . 347
macrophylla, Müll. Arg. 348
Suriana 63
maritima, Linn. . . 63
Surianeæ 65
SWIETENIA . . 68, 74
Chikrassa, Roxb. . . 76
Chloroxylon, Roxb. . 77
febrifuga, Willd. . . 76
Mahagoni, Linn. . . 74
Swietenieæ . . . 68
Swintonia . . . 103
Schwenckii, Teysm. . 104
Sycopsis Griffithiana, Oliv. 174
Symphorema . . 281, 282
involucratum, Roxb. . 282
pentandrum, Kurz . 282
polyandrum, Wight . 282
unguiculatum, Kurz . 282
Symphoremeæ . . 281
Symphyllia . . . 347
mallottiformis, Müll. Arg. 348
silhetana, Baill. . . 348
SYMPLOCOS . . 309, 253
cratægoides, Ham. . 253
Gardneriana, Wight . 253
glomerata, King . . xxv
grandiflora . . . 253
lucida, Wall. . . 254
racemosa, Roxb. . 253, xxv
ramosissima, Wall. . 254
spicata, Roxb. . . 253
SYRINGA . . 254, 256
Emodi, Wall. . . 256
persica, Linn. . . 256
vulgaris, Linn. . . 256
Syringeæ . . . 254
Syzygium . . . 191
sylvestre, Thw. . . 195

T.

TABERNÆMONTANA 260, 262
coronaria, Willd. 263, xxvi
crispa, Roxb. . . 262
dichotoma, Roxb. . 262
recurva, Roxb. . . 262
verticillata, Bedd. . 262
TALAUMA . . . 45
Candollei, Bl. . . 5
Hodgsoni, Hook. f. and Th. . . . . 5, i
mutabilis, Bl. . . 5
Rabaniana, Hook. f. and Th. . . . 5
TAMARINDUS . 134, 142
indica, Linn. . 142, xviii
TAMARISCINEÆ . 19
TAMARIX . . . 19
articulata, Vahl. . 19, 20
dioica, Roxb. . . 19
ericoides, Rottb. . . 19
gallica, Linn. . . 19
indica, Roxb. . . 19
salina, Dyer . . 19
stricta, Boiss. . . 19
Tapiria 103
hirsuta, Hook. f. . . 103
TAXINEÆ . . . 394
TAXODIEÆ . . . 394
Taxodium . . . 394
distichum, Rich. . . 394
TAXUS . . 394, 413
baccata, Linn. . . 413
nucifera, Wall. . . 413
Wallichiana, Zucc. . 413
TECOMA . . 274, 275
undulata, G. Don. . 275
TECTONA . . 281, 283
grandis, Linn. . . 283
Hamiltoniana, Wall. . 293
Tephrosia . . . *116*
candida, DC. . 118, xvi
TERMINALIA . 178, 179
alata, Roth. . . . 184
Arjuna, *Bedd.* . 184, xxx
belerica, Roxb. . { 179, xx, xxx
bialata, Wall. . . 182
Catappa, Linn. . . 182
Chebula, Retzius . { 180, xx
citrina, Roxb. . . 181
crenulata, Roth . . 184
fœtidissima, Griff. . 179
myriocarpa, H. and M. Arg. . . . 185
myriopteron, Kurz . 185
paniculata, W. and A. . 182
procera, Roxb. . . 179
pyrifolia, Kurz. . . 179
tomentosa, W. and A. { 182, xx
Ternströmia . . 27, 28
bilocularis Roxb. . 29
gymnanthera, Bedd. . 28
japonica, Thunb. . . 28
penangiana, Choisy . 28
serrata, Roxb. . 29, iv
TERNSTRÖMIACEÆ . 27
Ternströmieæ . . . 27
Tetracera . . . 2
Assa, DC. . . . 2
lævis, Vahl. . . . 2
sarmentosa, Roxb. . 2
trigyna, Roxb. . . 2
Tetracrypta cinnamomoides, Gard. & Ch. 178
TETRAMELES . . . 208
nudiflora, R. Br. . . 208

Pages

TETRANTHERA . 304, 309
amara Nees 309
angustifolia Wall . 311
apetala, Roxb 310
glauca Wall 309, 310
grandis Wall 310
laurifolia Jacq 310
monopetala, Roxb 309, 310, xxvii
nitida, Roxb 304
polyantha Wall 309
saligna Nees 311
tomentosa, Roxb 310
Wightiana, Wall 310
TEUCRIUM 300 302
macrostachyum, Wall 302
Thamnocalamus 426 427
Falconeri Hook f 427
spathiflorus Munro 427
Theobroma Cacao, Linn 45
Theophrasteæ . 238
THESPESIA 42 43
Lampas Dalz and Gibs 43
populnea Corr 43, vi
Thevetia 260
neriifolia, Juss 260 xxvi
Thibaudia variegata, Wall 233
Thunbergia 280
coccinea, Wall 280
grandiflora Roxb 280
laurifolia Ldl . 280
Thunbergieæ 280
Thuya 304
THYMELACEÆ 314
Thymeleæ 314
TILIACEÆ 51
Tilia europæa L 52
Tiliacora 11
racemosa, Coleb 11
Timonius 218, 219
flavescens, Kurz 219
Tinospora . 11
cordifolia Miers 11
Tinosporeæ
TODDALIA
aculeata Pers
bilocularis W an
Toddalieæ
Torricellia
tiliæfolia, DC
Tournefortia
viridiflora, Wall . 269
Toxocarpus 265
laurifolius, Wight 265
Tragia 347
TREWIA 347 349
nudiflora, Linn 349, xxix
Trevesia 208
palmata Vis . 208
Trichilieæ . 68
Triglosseæ 435
Trigonostemon 347
Lawianus, Nimmo 348
Triphasia 50
trifoliata, DC . 50
Tristania 187
burmanica, Griff 187
Triumfetta 51, 52
angulata, Lam . 52
rhomboidea, Jacq . 52

Trochiscanthes indica, Bedd 83
Trochodendreæ 4
Trophis aspera Retz 326
spinosa Roxb 323
Tupidanthus 208 209
calyptratus, Hook f and Th 209
TURPINIA 93, 102
nepalensis DC 102
pomifera, DC 102
Turræa 69
villosa Benn 69
virens, Linn 69

U

Ulmeæ 323
ULMUS 323 341
campestris Sm 341
effusa Willd 341
Hookeriana Blanchi 341
integrifolia Roxb 342, xxviii
lanceafolia Roxb 342
montana Sm 341
parvifolia Jacq 341
pedunculata Tourn 341
virgata Roxb 341
Wallichiana, Planch 341
Uncaria 217, 218
ferruginea DC 218
Gambier Hunter. 218
lævigata Wall 218
pilosa Roxb 218
sessilifolia Roxb 218
sessilifructus Roxb 218
Unona 7
longiflora, Roxb 8
Unoneæ 7
Urceola 260
elastica, Roxb 261
esculenta, Lth 261
Urereæ 323
Urophyllum 218

Uvaria .
cerasoides Roxb. . 9
dulcis Roxb. 10
ferruginea Ham . 8
longifolia, Lam 8
macrophylla Roxb. . 8
obtusifolia Roxb 8
odoratissima Roxb . 8
suberosa Roxb 8
tomentosa Roxb . 10
villosa, Roxb . 9
Uvarieæ . . . 7

V.

VACCINIACEÆ 233
VACCINIUM . 233, 234
acuminatum Kurz . 234
Donianum Wight . 234

Dunalianum Wight 234
Leschenaultii Wight 234
neilgherrense, Wight 234
obovatum Wight 234
rotundifolium Wight . 234
serratum Wight 234
variegatum Kurz 233
Vachellia Farnesiana 148
Vallaris 259
dichotoma, Wall 1
Vangueria 218 219
edulis Vahl 219
pubescens, Kurz 219
spinosa Roxb 219
Vanguerieæ 218
Vareca heteroclita, Roxb 16
VATERIA . 31, 41
indica Linn 41
lanceæfolia . . 33
malabarica, Ll. 41
VATICA 31 33
faginea Dyer 33
grandiflora Dyer 33
Helferi Dyer 33
laccifera, W and A 34
lanceæfolia Bl 33
Roxburghiana Bl 33
scaphula Dyer 33
Tumbuggaia W and A 34
Ventilagineæ 88
VENTILAGO . 91
calyculata . 91
maderaspatana Gaertn 91
maderaspatana Roxb 91
VERBENACEÆ 281
Verbeneæ 281
VERNONIA 232, 233
arborea ... *DC* 233
arborea Ham 233
Kurzii C B Clarke 233
volkameriæfolia DC 233
Wightiana, Bth and Hook f . 233
Vernonieæ 232
VIBURNUM 213, 214
cordifolium Wall 214
coriaceum Bl 214
corylifolium, Hook f and Th. 214
cotinifolium Don 214
erubescens Wall 215 xxiii
fœtens Dcne 215
fœtidum Wall 214
hebanthum W and A. 214
involucratum, Wall. . 214
lutescens Bl . 215
Mullaha, Ham. . . 214
nervosum Don 214
odoratissimum, Ker . 214
Opulus Linn . . 214
punctatum Ham 214
simonsi Hk f & Th . 214
stellulatum, Wall. . 214
Tinus, Linn 214
Vicia . 114
VILLEBRUNEA 322, 332
appendiculata, Wall 332
frutescens Bl . . 332
sylvatica Bl . . 332
Vinca . . 259
rosea Linn . . 259
VIOLACEÆ . . 16
Viola . . . 16

Pages.

Viscum 319
album, Linn. . . 319
articulatum, Brown . 319
attenuatum, DC. . . 319
monoicum, Roxb. . 319
moniliforme, W. and A. 319
orientale, Willd. . 319
ovalifolium, Wall. . 319
verticillatum, Roxb. . 319
VITEX 281, 296
Agnus-castus, Linn. . 296
altissima, Linn. 297, xxvii
alata, Roxb. . . 298
arborea, Roxb. . . 297
canescens, Kurz . . 296
heterophylla, Roxb. . 296
leucoxylon, Linn. . 298
limonifolia, Kurz . 296
Negundo, Linn. 297, xxvii
peduncularis, Wall. . 298
pubescens, Vahl. 297, xxvii
saligna, Roxb. . 298
trifolia, Linn. . . 296
Wimberleyi, Kurz . 296
Viticeae . . . 281
Vitis 93
elongata xv
himalayana, Brandis . 93
lanata, Roxb. . 93, xiv
latifolia, Roxb. . 93
repanda, W. and A. 93, xiv
vinifera, Linn. . . 93
Volkameria infortunata,
Roxb. . . . 299
serrata, Roxb. . . 299

W.

Wagatea . . . 134
spicata, Dalz. . . 135
WALLICHIA . . 415, 419
caryotoides, Roxb. . 420
densiflora, Martius . 419
disticha, T. And. . 420
nana, Griff. . . 420
Yomæ, Kurz . . 420
WALSURA 73
hypoleuca, Kurz . . 74
oxycarpa, Kurz . . 74
piscidia, Roxb. . . 74
pubescens, Kurz . . 74
robusta, Roxb. . . 73
ternata, Roxb. . . 74
trijuga, Kurz . . 69
tubulata, Hiern . . 74
villosa, Wall. . . 74

Pages.

WEBERA . . 218, 226
asiatica, Linn. . 226, xxiii
corymbosa, Willd. . 226
glomeriflora, Kurz . 226
monosperma, W. & A. . 226
myrtifolia, Kurz . 226
odorata, Roxb. . 226
oppositifolia, Roxb. . 226
scandens, Roxb. . 226
Weihea ceylanica, Baill . 175
WENDLANDIA . 218, 225
cinerea, DC. . . 225
exserta, DC. . . 225
Notoniana, Wall. . . 225
tinctoria, DC. . . 225
WIGHTIA . . . 273
gigantea, Wall. . 273
Wikströmia . . . 314
virgata, Meissn. . . 315
Willoughbeia . . 260
edulis, Roxb. . . 260
martabanica, Wall. . 260
Winchia . . 260, 261
Wintereæ 4
WOODFORDIA . . 200
floribunda, Salisb. 200, xxi
fruticosa, Kurz . . 200
tomentosa, Bedd. . 200
WORMIA . . . 2, 4
bracteata, Bedd. . . 2
triquetra, Rottb. . 4
Wrightea . . . 180
caryotoides, Roxb. . 420
densiflora, Brandis . 420
WRIGHTIA . . 260, 264
antidysenterica . . 420
coccinea, Sims . . 264
mollissima, Wall. . 264
tinctoria, B. Br. . 263, 264
tomentosa, Röm. 264, xxvi
Wallichii, DC. . . 264

X.

Xanthochymus . . 23
dulcis, Roxb. . . 23
ovalifolius, Roxb. . 23
pictorius, Roxb. . . 23
Xanthophyllum . . 19
affine, Korth. . . 19
angustifolium, Wight . 19
Arnottianum, Wight . 19
flavescens, Roxb. . 19
glaucum, Wall. . . 19

Pages.

Griffithii, Hook. f. . 19
virens, Roxb. . . 19
Xerospermum, . 93, 94
Noronhianum, Bl. . 94
Ximenia . . . 80
ægyptiaca . . . 65
americana, Willd. . 80
XYLIA . . . 145, 148
dolabriformis, Benth. 148, xviii
Xylocarpus Granatum,
Kön. . . . 74
Xylopieae . . . 7
XYLOSMA . . . 16, 17
controversum, Clos. . 18
latifolium, Hk. f. & Th. 18
longifolium, Clos. . 18

Z.

Zalacca . . . 415, 425
Wallichiana, Mart . 425
Zanthoxyleæ . . 59
ZANTHOXYLUM . 59, 60, viii
acanthopodium, DC. 60 viii
alatum, Roxb. . . 60
andamanicum, Kurz . viii
Budrunga, DC. . 60, ix
Hamiltonianum, Wall. ix
khasianum, Hook. f. . viii
ovalifolium, Wight . ix
oxyphyllum, Edgew. . viii
Rhetsa, DC. . 60, viii
tetraspermum, W. & A. viii
tomentellum, Hook. . viii
triphyllum, Thwaites . 60
ZINGIBERACEÆ . 415
Zingiber officinalis, Roscoe 415
Zizypheae . . . 88
ZIZYPHUS . . . 88
flexuosa . . . 89
Jujuba, Lam. . 88, xiv
latifolia, Roxb. . 90
microphylla, Roxb. . 89
Napeca, Roxb. f. . . 89
nummularia, W. and A. 89
Œnoplia, Mill. . 89, xiv
oxyphylla, Edgw. . 89
rugosa, Lam. . 90, xiv
vulgaris, Lamk. . . 88
xylopyra, Willd. . 90, xiv
Zollingeria . . 93, 94
macrocarpa, Kurz . 94

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